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Private Flying

Flying Wing

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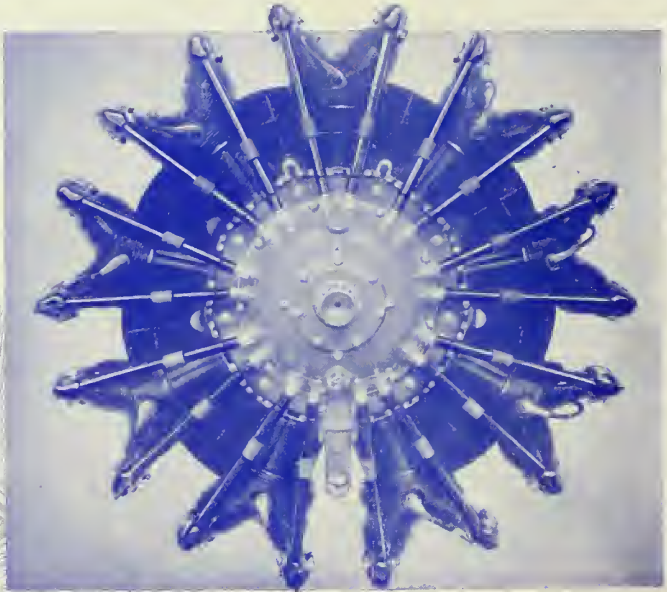

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Aero Digest, January, 1933. *Published monthly by Aeronautical Digest Publishing Corp., at 515 Madison Ave., New York, N. Y. Yearly subscription, $3.*
Volume 22. Number 1. *Entered as second class matter July 17, 1922, at the Post Office, New York, N. Y., under the Act of March 3, 1879.*

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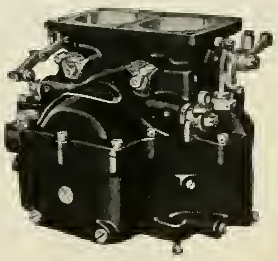

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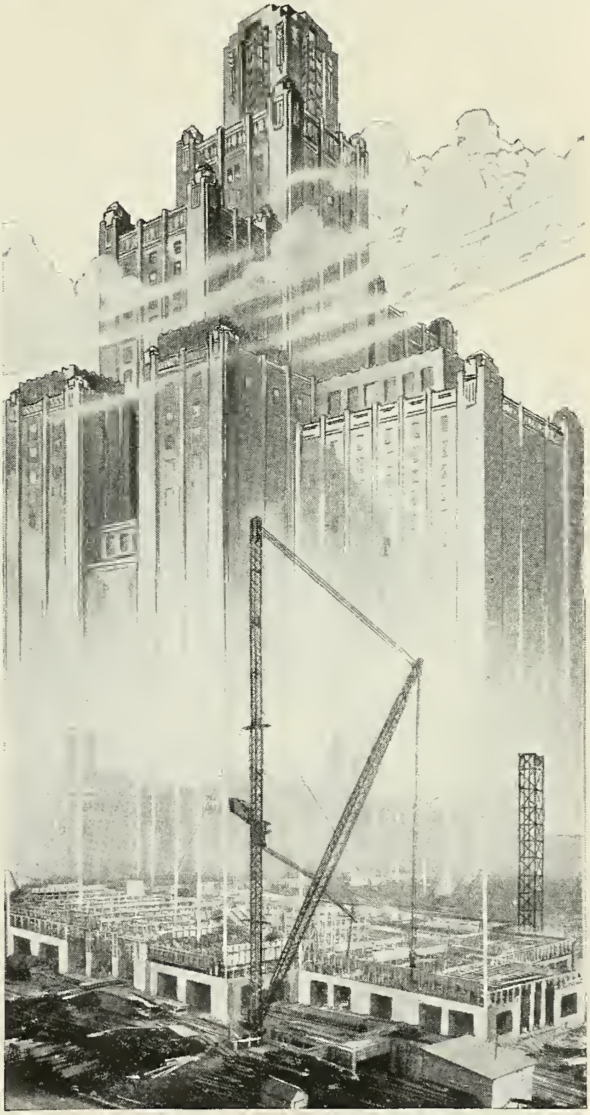

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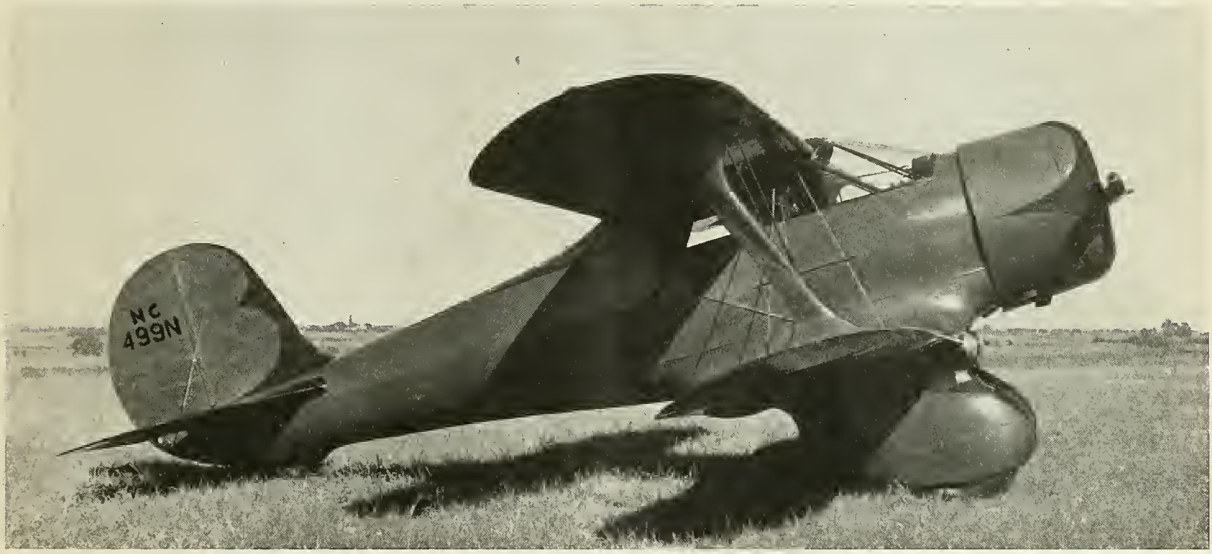

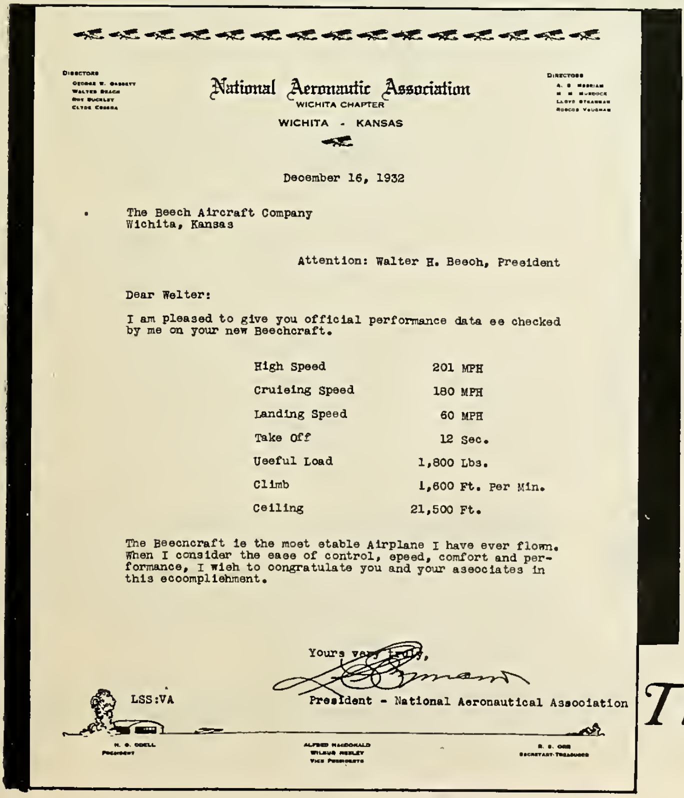

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WICHITA - KANSAS

December 16, 1932

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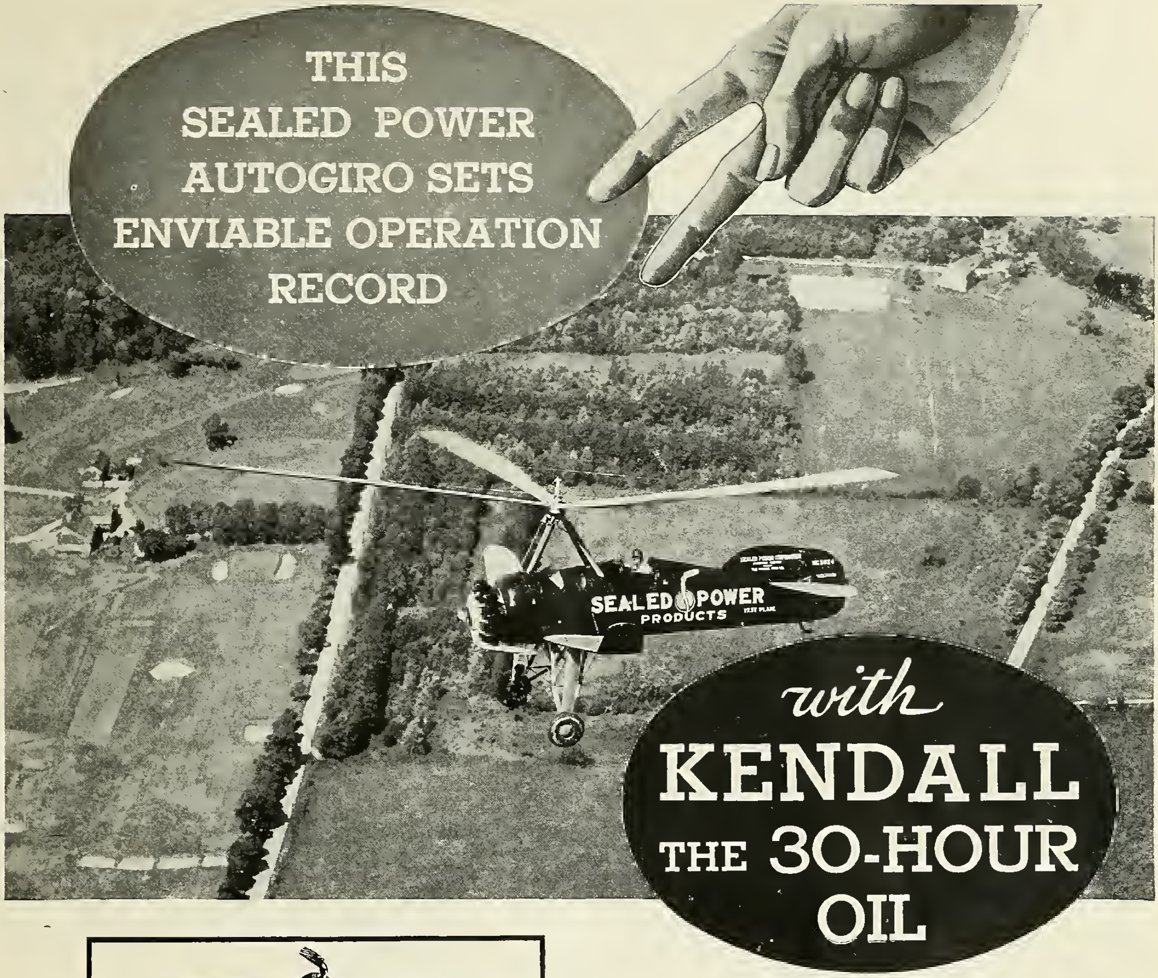

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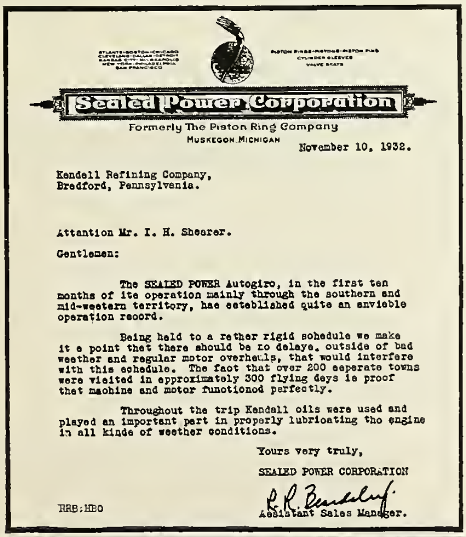

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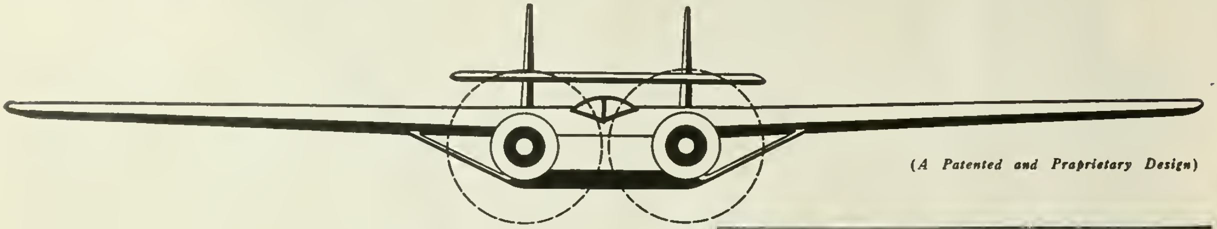

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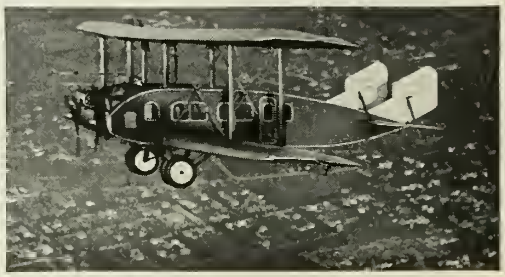
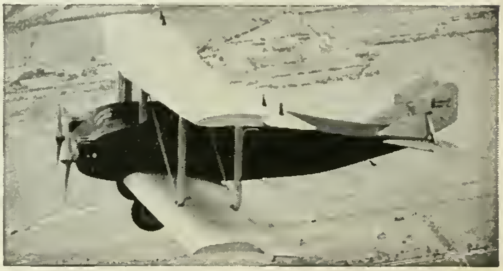
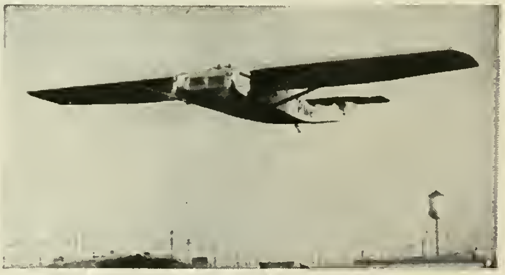


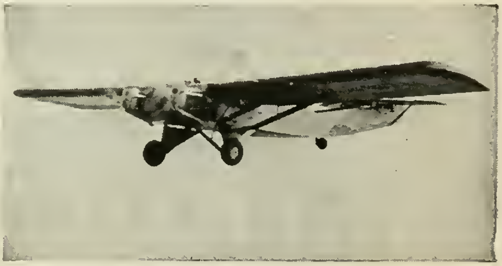
1920—*The RB-1, first airfoil fuselage center section.*



1924—*The RB-2, first air freighter. Carrugated metal construction.*



1927—*The CB-16, first multi-engine design with retractable landing gear.*



1930—*The UB-20, first American transport with flat stressed skin construction.*

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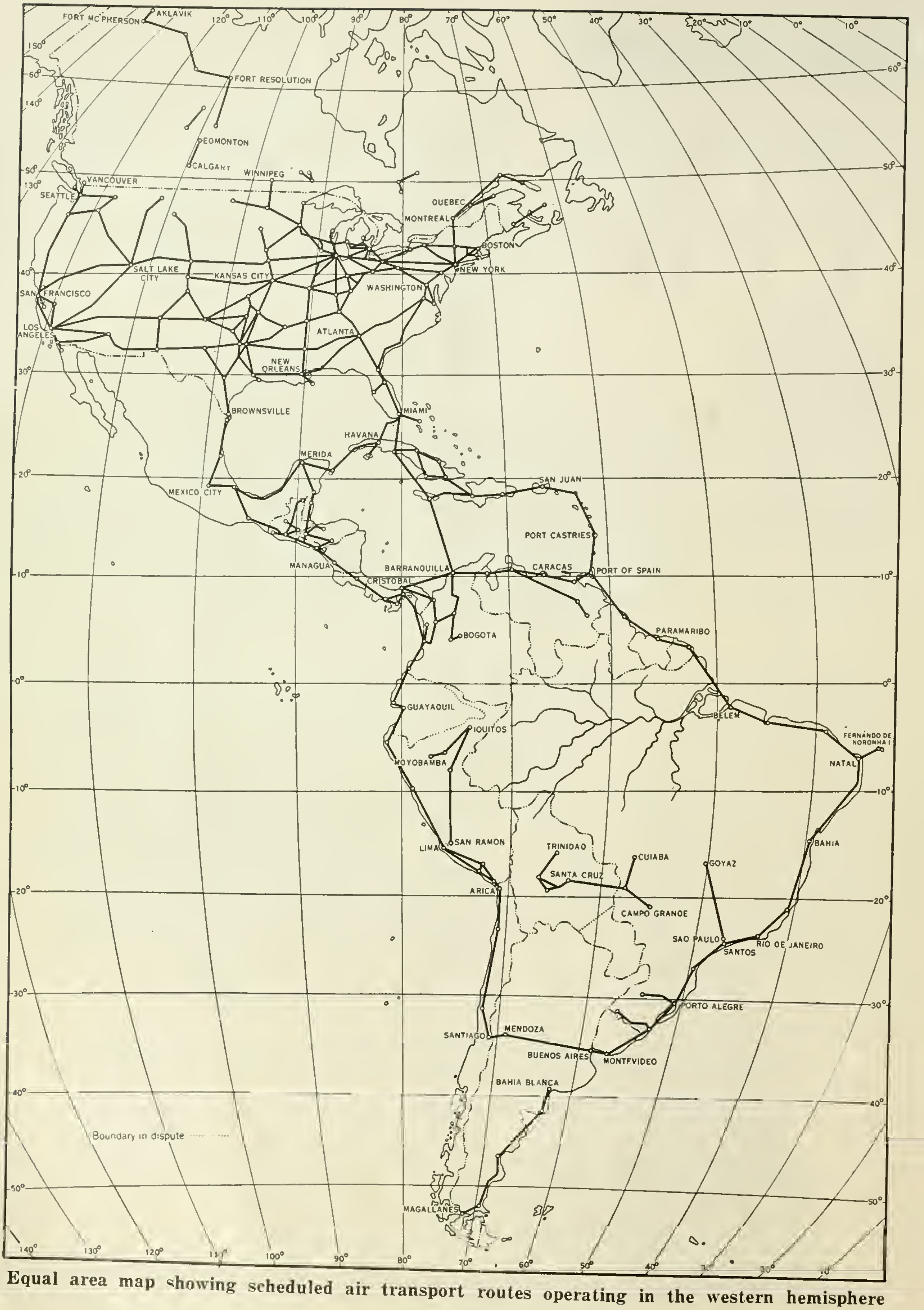

Equal area map showing scheduled air transport routes operating in the western hemisphere

MAPS FOR AIR NAVIGATION

By Harry H. Blee

Director of Aeronautic Development
United States Department of Commerce

REALIZING that the march of civilization always has gone hand in hand with the advancement of transportation and communication facilities, the nations of the world are deeply interested in the progress of the aircraft industry. They recognize the fact that this industry is engaged in the development and operation of high-speed vehicles of transportation that are free from the limitations imposed upon surface transportation by topography, vehicles of transportation that bid fair to open to every community the gateway to all the great markets and pleasure centers of the globe.

The western hemisphere, with its vast areas, many of which are as yet undeveloped, and with its great distances between centers of population, is in a position to take maximum advantage of general private and commercial flying as well as of scheduled services operating over the routes of trade and travel.

The past few years have witnessed an extraordinary development of aeronautics in this hemisphere and in the application thereof to every-day commercial, industrial and social life. And now we find the airplane beginning to play an active part in the development of the great resources of regions otherwise quite inaccessible or that could be reached by other means only at great, if not prohibitive, expense and difficulty.

From the standpoint of air transport, the scheduled transportation of passengers, mail, and express over established routes by air, there has been laid in the Americas, during this brief period, the foundations for a great network of air lines that will extend into the far reaches of every country and spread across the seas to the nations of the Old World. At present this high-speed transportation system (illustrated on the opposite page), represents a route mileage of approximately 63,500 miles with schedules calling for the flying of some 158,300 miles every twenty-four hours. It is gratifying and at the same time significant that the total volume of business flowing over this system is showing a continued annual increase.

In order to assist in bringing about the maximum degree of safety and reliability in flying operations, a number of countries have undertaken the provision of aids to air navigation similar to those which have for many years been extended to marine navigation. These air navigational aids include modern air terminals, airways equipped with beacon lights and lighted intermediate landing fields, radio communication stations, tele-typewriter circuits, weather reporting service, radio range beacons and goniometry stations, and air navigation maps. This last facility constitutes the subject of the brief discussion presented in this article.

Maps and charts are among the most important instruments of air navigation. As in other fields of mapping, it is important that air navigation maps be especially constructed to meet the particular requirements of the purpose for which they are intended. To this end careful consideration should be given the selection of the system of projection to be used, realizing that the projection is the framework of the map structure and hence determines the basic characteristics of the map.

Air navigation maps should be of convenient size to facilitate their use on board aircraft and should be drawn to suitable scale to permit showing necessary detail. They should be as clear and as simple as possible and present in a thoroughly intelligible manner the information needed by the aerial navigator. Outstanding features of the terrain as viewed from the air should be shown in true shape and in correct relation to each other and special emphasis should be given air navigational aids and any serious obstructions to air navigation. Map symbols should be distinctive, readily legible, and in conformity with uniform standards.

In carrying out its program for the publication of air navigation maps, the United States Department of Commerce issues these maps in two forms, strip maps and sectional maps. The former, as the name implies, show the strips of terrain traversed by individual routes or airways. The latter constitute a series of eighty-seven oblong sections covering the entire United States. Both forms of maps are published on a scale of 1 to 500,000, or about 8 miles to the inch.

The base of these maps is an accurate representation of the territory, showing elevations, rivers and lakes, railroads, highways, political boundaries, cities and towns. These features are set forth in black and color, and superimposed upon them in red are such special features as airports and

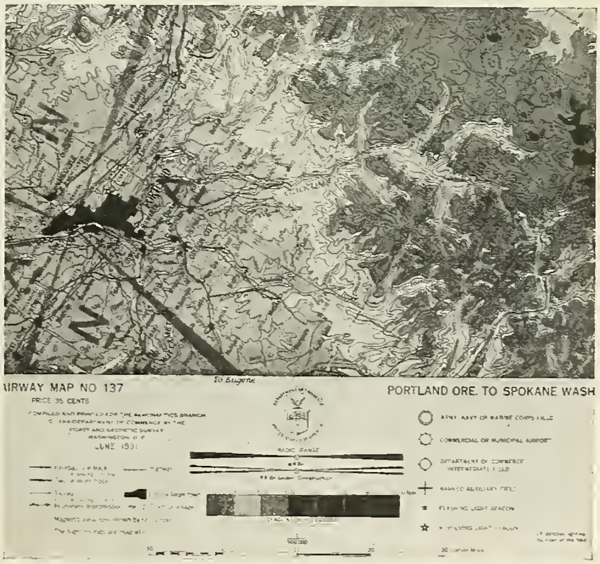
To Eugene
IRWAY MAP NO 137
PRICE 35 CENTS
COMPILED AND PRINTED FOR THE AERONAUTICS BRANCH
COAST AND GEODETIC SURVEY
WASHINGTON D C
JUNE 1931
PORTLAND ORE. TO SPOKANE WASH
RADIO RANGE
COMMERCIAL OR MUNICIPAL AIRPORT
DEPARTMENT OF COMMERCE INTERMEDIATE FIELD
FLASHING LIGHT BEACON
1:500,000

Figure 1. Photograph of a small portion cut from one end of a typical airway strip map prepared by the Department of Commerce

landing fields, seaplane anchorages, beacon lights, radio aids to air navigation, prominent transmission lines, special obstructions to air navigation, and isogonic lines (lines passing through points of equal magnetic variation). Elevations are indicated by contours, color tints (gradient tints), and by elevation figures and hachures.

The photograph presented in Figure 1 shows a small portion cut from the end of a typical airway strip map. These maps are printed on heavy chart paper and cover strips 80 miles in width and ranging from 200 to 400 miles in length—the size of each sheet being 11 inches wide and some 24 to 48 inches long, a very convenient form and size which can be folded readily for use in the air.

A photograph of a typical sectional map is given in Figure 2. As will be noted from the key sheet shown in Figure 3, the series of sectional maps for the United States follows a modification of the arrangement of the International Millionth Scale Map of the World. This world map divides the globe into units of 4 degrees of latitude by 6 degrees of longitude. For the purpose of the airway maps a further division is made to give units of 2 degrees of latitude by 6 degrees of longitude, the resulting map size averaging about 23 inches by 43 inches. These maps are printed on a tough bond paper which is easily folded. In service they are generally folded once from top to bottom with the face out and the fold extending laterally across the map and then folded (accordion style) six times. This method affords ready access to any part of the map.

To assist the users of the maps in making the transition from one sheet to the next, an overlap is provided between adjoining sections. Maps of contiguous sections may be joined together to form a map of the area covered by any particular operation or to permit cutting a strip map covering the route between any two points.

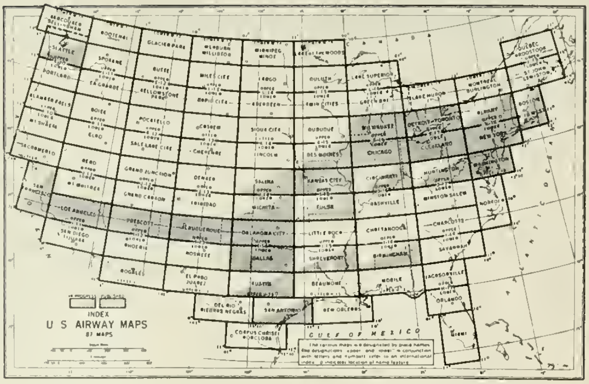

Fig. 3. Key sheet indexing 87 United States airway maps

The airway strip maps, which involve less area than the sectional maps and which are primarily for service on the main arteries of travel, were the first to be undertaken in the general program. However, with the increase in density of flying operations over all parts of the country there developed a definite demand for the sectional maps. Since both forms of maps are published on the same projection and the same scale, the compilations for the one are directly usable in the construction of the other.

Before selecting the projection to be used in its air navigation maps, the Department of Commerce made a thorough study of the various phases of the problem, realizing that these maps would be used extensively in connection with pilotage, dead reckoning, and directional radio (including radio range-beacons and radio goniometry), and in some cases with celestial navigation. It was also recognized that the maps would be used by a vast number of lay pilots, in addition to professional pilots and navigators, and that confusion would be avoided if features

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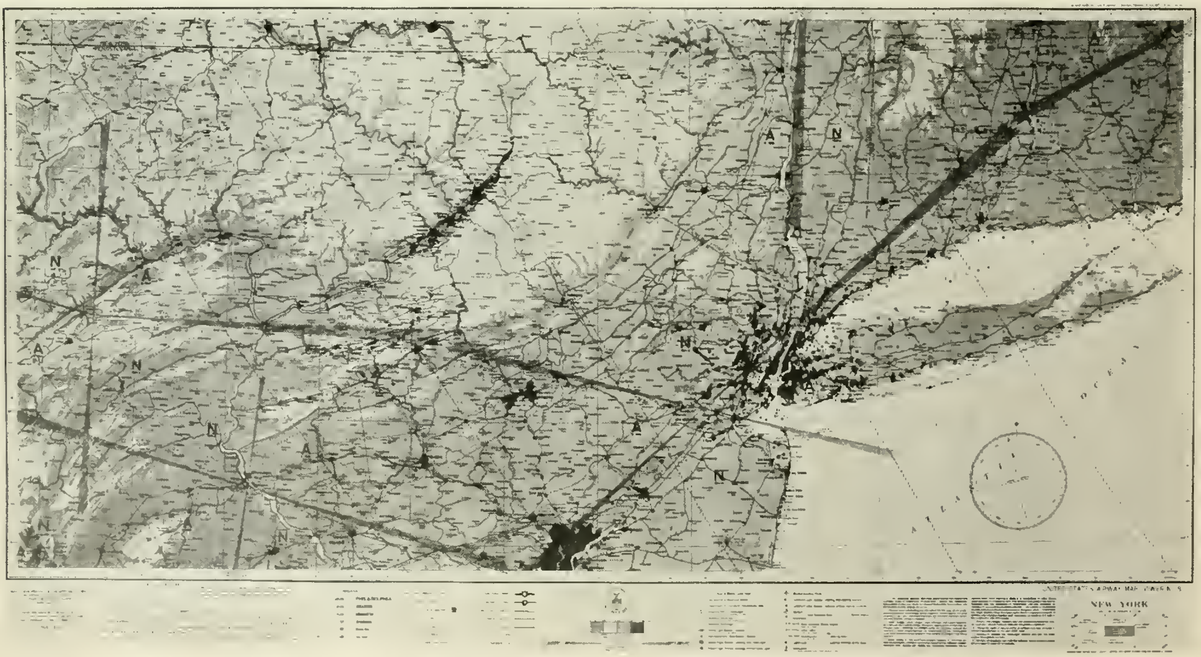


Figure 2. Typical sectional air navigation map photographed in greatly reduced size

AIR—HOT AND OTHERWISE

JOHN DWIGHT SULLIVAN ◉ WIND THE ALARM CLOCK

By

Frank A. Tichenor

IN the new administration somebody must fill the shoes now occupied by Trubee Davison. They will miss him and so shall we, when we visit his old office down in Washington. But a political change is a political change and does not necessarily mean disaster. So—who?

We venture to suggest John Dwight Sullivan of New York for whom there are numerous "whys" and no "why nots." He is a leader if his heart is in it, and although a lawyer by profession, his heart is definitely in aviation.

His first noteworthy leadership was the presidency of his class in Princeton University. He is young and magnificently up to date, like the aviation which is his special interest outside his own profession. Ere he emerged from New York Law School in 1916, he had served with the first Aero Company of his State's National Guard, the first flying National Guard unit in the United States. He was made a First Lieutenant, U. S. Army Air Corps, and served as such from 1917 to 1919.

In 1920 he was admitted to the bar and since has practised with some degree of specialization in the field of aeronautical law. He was a member of the (Hoover) Metropolitan Airport Fact-Finding Committee in 1927 and Chairman of the Legislative Committee of New York State's Aviation Conference until its dissolution in 1930; a member of New York City's Committtee on Airports and Aviation in 1929; he is a member of the New York City Police Department's Committee on Aviation; in 1929 Governor Roosevelt appointed him a member of the New York State Aviation Commission (and he still serves); he is on the Legislative Committee of the Aeronautical Chamber of Commerce; a member of the Committee on Governmental Control, American Academy of Air Law; Regional Vice-President of the National Association of State Aeronautical Officials and member of the Institute of Aeronautical Science.

The Democratic party has aviation experts competent to promote, assist and serve our aeronautical interests in peace and war, and John Dwight Sullivan perhaps looms as a young chief among them. In him, Trubee Davison would have a fit successor.

HAPPY NEW YEAR, and all that. We'll have one only if we earn it. Thirty, thirty-one and thirty-two will go into aviation's history as three lean years following a period of feasting. We ate and drank much during that long feast. Perhaps we overdid it and thus helped along the dullness of the years which have succeeded. Over-indulgence always makes men dull. The future ever pays for the excesses of the past. But let's hope that that dull future now is, itself, part of the past, and that the present as it flows to us will be agreeable. It can be made so by intelligent effort. Our effort. It won't be (can't be) made so by anybody else.

We have been walloped anyway, whether or not we had earned it. And we can take advantage of it. Humanity learns more from wallops than from love pats.

We of the air industry deserved our spanking. It was our own fault.

Let's get off the spot. Let's forget the other fellow's slouchy house and set our own in order. We've got to be big, for it takes big men to admit their own mistakes, and mistakes must be admitted before they can be corrected.

Waste, extravagance (which is the worst sort of waste) must be paid for, and if it is in aviation the aviation industry must pay for it, whether individuals, the corporations, the services or any governmental branch have been responsible for it.

Success in the business management of aeronautics can be based only on straight thinking and its practical application, and business management of aeronautics has gone a long way off its course. We have been flying wild.

You ask for an example?

Well, one is the Aeronautical Chamber of Commerce. Enough money has been spent on it to give us an organization capable of doing for aviation what the Automobile Chamber of Commerce does for the motor car industry. Instead, it has developed the Transportation Section—and no other! Even this section could do much more if properly organized and operated on a competent plan.

The Chamber should get a man with real ability, someone who knows how, someone never before connected with any of the rival organizations and therefore free of the deadening influences of jealousies, politics and prejudice. Such a man might be high priced, but salary doesn't matter. Ten, fifteen, twenty thousand—if the man knows what to do and how to do it any salary will be cheap. In these days when really big executives as well as workmen have been "let out" all over the country, it should not be hard to find exactly the right man or expensive to secure him.

If the muddlers and the self-seekers can only be kept out of the picture! Calling on the President and being photographed before the White House will not get new business or new appropriations for an industry which needs both. Had the Aeronautical Chamber been alive to its opportunity when the Coolidge Railway Commission met in New York recently, the Commission would have given the Chamber, instead of Bingham, the N. A. A. and his invited satellites, the center of the stage.

The task of laying the requirements of the industry in a proper way before the Railway Commission was a man's job and we had men in the industry capable of doing it. The findings of this Commission may have a far-reaching effect upon the future of American aeronautics. If it is a good one, the industry as now organized will not be entitled to credit. We were asleep at the switch again.

There is still hope, however. It may not be too late. It won't be if we wake up from our dangerous nap and

(*Continued on page* 64)

EDITORIALS

***"There are thousands of passengers and tons of mail sailing across the oceans every week. We predict that a small percentage of this traffic will be willing to pay a premium for speed, and it is for this small percentage we propose to create an airship service."*—Dr. Karl Arnstein, Vice President and Chief Engineer, The Goodyear Zeppelin Corporation.**

Air Mail and How to Save It

REAL danger threatens the Air Mail, just at the moment of its greatest opportunity. It has been hit by the depression because of an astonishing management which, as the people's funds decreased, increased Air Mail rates from half-a-dime to eight cents. It has been exactly that sort of misdirection which might be expected from a Postmaster General who, when his Government motor car failed to accommodate him when he was wearing a top hat, found the only remedy to be the purchase of a new and higher car. Of course, with the taxpayers' money.

Brown's plans for the curtailment of the Air Mail service because a raise of rates does not increase its business, are characteristic. If he had tried the thought which we without charge offered him some time ago of making the Air Mail rate two cents (not three), every plane would have been traveling full of mail from the morning of the low rate's first day, and earning a profit for the operators, for the Government and for the users of Air Mail as never has been earned before by any postal service.

Brown may be a wondrous politician, although his activities in Ohio during the last campaign did not prove it, but in our opinion he should have been given a four year course of instruction before being permitted to assume the duties of the Postmaster Generalship, which would have left him now on the threshold of entirely new activities, and with no trail of misapplied ideas in the Post Office behind him.

To meet the hard times in the Post Office by raising postal rates has been like meeting hard times in a butcher shop by raising the price of meat, thereby increasing the number of vegetarians. Low rates attract business; high rates drive it away. But why try to convince a man who makes the Government buy a new motor car to fit his ceremonial silk hat?

◆

***"The American Legion believes in preparedness, not for war, but because preparedness is the greatest preventive of war."*—Louis Johnson, National Commander, American Legion.**

Perhaps Farewell, Lewis and Victory

SENATOR McKELLAR must have been reading AERO DIGEST. At any rate he has discovered that the National Advisory Committee for Aeronautics, which recently has had its appropriation decreased, deserves none, as it stands. So astute McKellar lists it for discontinuance under the program for wiping out "useless Federal units" which this statesman from the good old State of Tennessee proposes.

Theoretically this body has a place in American aeronautics, but under Messrs. Lewis and Victory, who apparently are riveted to its managerial direction, it has not filled this place. Properly directed, properly manned, it might have been of great use to the industry and to the Services. But long since it ceased to be a research body and became an advertising club, a rest home, a comfortable refuge for the two who have controlled it.

Washington will not miss Lewis, nor yet will it miss Victory. We shall bid them farewell with a smile and hearts warming with real hope that in the natural course of events something presently will be submitted for that which has been a costly nothing.

If there is to be Federal expenditure for aeronautical experiment it should be wise expenditure, really made for the benefit of aeronautics, not for that of individuals. With the change we may get something at no great expense.

◆

***"The increasing patronage of our airlines by the traveling public indicates increasing confidence and insures a brilliant future for aviation. Progress from now on depends upon the industry itself, and men with adequate training will be in great demand."*—Casey Jones, President of the Casey Jones School of Aeronautics, Incorporated.**

Harmful Motion Pictures

THE motion picture "AIR MAIL" offered the following inducements for citizens to entrust their letters and valuables to the air: A mail plane crashed and burst into flames, entrapping the pilot who screamed for someone to shoot him and put him out of his misery (which someone obligingly did); the mail was partially destroyed by fire; another mail plane struck high tension wires and crashed, killing the pilot; a third plane crashed in the mountains, seriously injuring the pilot; a fourth plane, damaged in landing to pick up the injured pilot, took off and lost a wing in flight; the rescued pilot came down by parachute; the rescuing pilot, crashing with the ship, was only injured; a tawdry sex drama was sandwiched in between crashes; and finally the author of the atrocity was publicized in newspapers as "Lieut. Commander Frank Wead . . . was once a great flier. He flew for five years only to later tumble down stairs and fracture his neck. The Navy's loss is the stage's gain."

It would have been commercial aviation's gain if the fracture had been bigger and better. However, the author and the producers are only partly to blame. Those in the aviation industry, in charge of airports and airlines, must shoulder the major part of the censure for their thoughtless and ill-advised cooperation in this definitely harmful propaganda that is spread before the eyes of millions.

The Aviation Committee of the Los Angeles Chamber of Commerce urges air transport operators and airport managements to accord no cooperation whatever to any motion picture company unless the script covering the picture is deemed to be acceptable to the best interests of the aviation industry.

In short, if the motion picture industry is determined to provide thrills at the expense of the good name of aviation, and send their camera men around to shoot flying scenes, it may be necessary to recall the advice given by New York's Police Commissioner to his men when dealing with bandits and other dangerous criminals—"SHOOT *FIRST*."

OBSERVATION AVIATION

Major General James E. Fechet, U. S. Army (Ret.)

OBSERVATION aviation is the *air service,* often called "the eyes of the Army," as distinguished from the *air force* (i. e. bombardment, attack and pursuit aviation) which strikes direct blows at the enemy.

The first military use of the airplane was for aerial reconnaissance, and the history of American heavier-than-air observation aviation begins with the Army's participation in aviation. On July 1, 1907, an aeronautical division of the Signal Corps was established and a little over a year later the Wright Brothers fulfilled the terms of a contract and delivered the first machine to the Army. Valuable experimental research and development work was carried out by Army personnel during the next few years, but due to a lack of funds and the proper appreciation of the place of the airplane in actual warfare, the entrance of the United States into the World War found it with only 55 airplanes, all obsolete and fit only for training purposes.

Before the World War, few machines had appeared in military activities. The French and British each organized an air service in 1912 and the Germans in 1913, although Germany had started an Army flying school in 1910. Europe in general was just about two years behind us in aerial observation—until 1914.

The outbreak of the World War in 1914 found all the combatants with some sort of air organization. From the beginning, air observation played an important part; even a decisive one, for in August, 1914, the Germans failed to take advantage of the information furnished to them by their observation aviation and lost an opportunity to destroy the French Fifth Army and the British Expeditionary Forces on the Allied left wing. German leaders later admitted that the German High Command in 1914 did not have a proper appreciation of the importance of air observation.

Every military power today maintains observation aviation units to cooperate with its ground, air and naval forces. Air observation has changed ground warfare; especially has it nearly eliminated the meeting engagement, i. e., "the collision between two hostile forces, neither of which is deployed for battle."

Observation aviation reconnoiters and secures information for its own air force (i. e. attack, bombardment and pursuit) objectives. It locates suitable objectives for friendly artillery and adjusts the artillery fire. It keeps the ground commander informed of his own front line positions and those of contacting (friendly) units of his wings, and the location of the enemy front lines, as well as movements and dispositions of enemy forces and supplies back of the lines. Observation aviation is divided into heavier-than-air using airplanes and lighter-than-air using balloons and dirigibles, but this article will describe the former.

The observation squadron, composed of 31 officers, 113 enlisted men and 13 airplanes, is organized as follows:

	Airplanes	*Commander*	*Total officers*
A Flight	4	Captain	8
B Flight	4	Captain	8
C Flight	4	Captain	8
Commander's Plane.	1	Major	2
Administration, technical transportation........			5

The observation group consists of Group Headquarters and Headquarters Squadron, one service squadron and four tactical observation squadrons.

Observation aviation in the Air Corps is represented by the following units:

9th Observation Group, Mitchel Field, N. Y. (1st, 5th and 99th Observation Squadrons, 8th and 14th Photo Sections, 61st Service Squadron.)

12th Observation Group, Brooks Field, Texas. (12th, 22nd and 88th Observation Squadrons, 1st Photo Section, 62nd Service Squadron.)

15th Observation Squadron with 5th Photo Section, Scott Field, Belleville, Ill.

91st Observation Squadron with 15th Photo Section, Crissy Field, San Francisco, Calif.

16th Observation Squadron with flights at Langley Field, Va., Ft. Bragg, N. C., Ft. Riley, Kansas, Ft. Sill, Okla., and Ft. Benning, Ga.

4th and 50th Observation Squadrons, Luke Field, Hawaii.

7th Observation Squadron, France Field, Canal Zone.

44th Observation Squadron, Albrook Field, Canal Zone.

2nd Observation Squadron, Nichols Field, Philippine Islands.

The nineteen National Guard air units are observation squadrons, and reserve officers not on extended active duty are generally trained in observation type aircraft. In his annual report for 1932, General Benjamin D. Foulois, Chief of the Air Corps, remarked upon the advisability of converting some of the National Guard squadrons from observation to air force.

In time of war an observation group is assigned to the General Headquarters of our forces. One group is also assigned to the headquarters of each field army and one to each corps. The one group to a corps gives one squadron to each division, and as all the divisions of a corps are not always at the front, the otherwise inactive squadrons may be engaged in general work for the corps.

Generally speaking, the higher the command for which they work, the deeper will the observation airplanes penetrate into enemy territory. The General of the armies would want to keep informed of the situation far back in the enemy's industrial area, but a division commander would only be interested in the front line situation. Two types of observation airplanes are considered necessary, *army* observation and *corps* observation.

The first type is three-place (pilot, observer and radio operator) with two supercharged engines and has a flying endurance of from five to seven hours at full throttle. It flies the distant daylight (and hence, high-altitude) reconnaissance missions of the army, of GHQ, of the air force and of the sea coast patrol. This airplane (without superchargers, and with some other modifications) would be used for night reconnaissance missions. The Fokker O-27 is an Army reconnaissance type. It is a high-wing monoplane with two Curtiss Conqueror engines and with the landing wheels retracting behind the engine nacelles. The Douglas O-35 is another of this type. It is a gull-winged monoplane with two radial air-cooled engines.

A study is under way to determine the possibility of readily converting these types into light bombers, or vice versa; an arrangement both tactically and economically advantageous. The characteristics and equipment of such a craft should be as follows:

a. High speed at altitudes above 15,000 feet is paramount. It increases the possibility of getting into enemy territory, securing the information and returning with it without being located or attacked by hostile pursuit aviation and minimizes the time of exposure to enemy anti-aircraft fire. Speed range is important in that it allows the pilot to change speeds when attacked and so "jockey" back and forth to confuse the aim of the enemy pursuit pilots diving at him and aiming their guns as they dive.

b. Vision in every direction for all members of the crew is also of utmost importance, except perhaps for the radio operator who is also a gunner. The protection of the crew, especially the observer-gunner, against the air stream is obviously desirable. An opening in the floor gives the pilot the necessary ground vision for flying photographic missions, and makes it possible for him to fly directly over the spot of the strip to be photographed. Vision was one of the main reasons for the development of two-motored three-place airplanes instead of the single-motored two-place type for Army reconnaissance work.

c. A high degree of stability is essential, permitting prolonged blind-flying through clouds to escape enemy pursuit and anti-aircraft, until the objective is reached. Maneuverability is not an essential characteristic.

U. S. Army Air Corps photo

Twin-engined General Aviation YO-27 Army Observation plane

d. According to the present conceptions, a 300-mile radius of action is sufficient for the longest mission.

e. Changing developments make it unwise to specify that water-cooled, prestone-cooled, air-cooled or Diesel engines should be used exclusively.

f. Armament consists of a single .30 caliber Browning machine gun on a flexible mount in both front and rear cockpits. Twin-mounted guns could also be used to advantage. No offensive armament (such as bombs) is carried. The observation crew must fight to defend itself when necessary, but *never* attack.

g. A camera is carried in the front (nose) cockpit. It is used for vertical photographs. A multi-lens camera may be used for important photo-mapping missions, where it is desired to study a certain area in enemy country.

h. A two-way radio telegraph set of intermediate frequency and a 250-mile operating range is being developed by the Signal Corps for Army observation.

Corps observation aircraft are designed for daylight missions and shallow penetration into enemy territory. They are light, fast, single-engined, two-place (pilot and observer), without supercharger equipment and with an endurance of from one and one-half to two and one-half hours at full throttle, or three to four hours at cruising speed. The standard corps observation types are the Thomas Morse O-19E with 450 h.p. radial air-cooled engine, and Douglas O-25C with 600 h.p. prestone-cooled engine; the Douglas O-38B with 525 h.p. radial air-cooled engine and the Curtiss O-40A sesquiplane with a 550 h.p. air-cooled engine and retractable landing gear are being developed for corps observation work. The desirable characteristics and equipment for these types are as follows:

a. High speed is most essential to enable it to escape enemy pursuit. Example: Observation airplane with 180 m.p.h. top speed and ten miles inside enemy lines is surprised by a 200 m.p.h. top speed pursuit two miles away. Before pursuit overtakes it, observation plane will be five miles inside own lines, flying low to bring enemy pursuit within gunfire range. Speed range adds to defensive power of this type as in Army observation types, but a low flying speed is more important in allowing it to hover near a spot to give observer a chance to examine carefully that particular spot.

b. A maximum of vision for both pilot and observer is always sought when designs are changed. Vision downward and forward is important to the observer who occupies the rear cockpit.

c. A climbing rate sufficient to get it off small advance airdromes is necessary. Ceiling is unimportant as most work is done below 10,000 feet, but it should be able to clear the highest mountain range in the United States to enable it to move from one coast to another.

d. It should be maneuverable near the ground, to aid the observer and to escape hostile ground fire or air fire.

e. Protection from slipstream is important for the observer, as he works with maps in his cockpit.

f. Most missions, except artillery adjustment, require one hour or less. Artillery adjustment requires from one to two hours. One and one-half hours' fuel at full throttle gives three hours' at low cruising speed, and this is sufficient.

g. The constant subjection of the corps observation airplane to hostile rifle fire has resulted in a serious study of the possible armoring of this type. At present, armoring results in greatly decreased performance.

h. An air-cooled engine is the most desirable due to its comparative invulnerability to rifle fire, as radiators offer too much of an area for possible puncture by a bullet.

i. Existing two-seaters have one .30 caliber machine gun mounted in front of the pilot and synchronized to fire through the propeller. New models will have this one mounted on a wing outside the propeller arc. The observer has twin-mounted Lewis guns or a single Browning gun, flexibly mounted. The twin Browning T-2 model mounting will be used as soon as available in production quantities. No bombs will be carried, as the mission of the observation crew is observation and not attack.

j. The K-6 camera for taking oblique photographs is standard equipment. At present it is mounted on the gun mount. As this installation could not be used in time of war, when guns for defense must always be ready, a new mount with the camera projecting through the side of the fuselage is being developed.

k. Communication is effected by radio, drop messages, ground panels and the hooking up of written messages and maps from the ground. The radio set (SCR-134) weighs about 100 pounds and has a range of 30 miles with the telephone and 150 miles with telegraph. The Signal Corps has developed a satisfactory 50-pound set with built-in antennae.

In describing the function of observation aviation it should be emphasized that the observation airplane is designed, constructed and equipped as efficiently as possible for its particular job. The ground units and the air force are often impatiently waiting for the information which they expect a certain observation crew or flight or squadron to bring back. For the observation crew to leave its work and ground strafe even the most tempting target would be both a case of aerial A.W.O.L. and one of using the wrong tool for the job.

At the peace-time maneuvers of a division or brigade or even a smaller unit, the observation aviation assigned one force is often used to attack the opposing force. It should be understood by witnesses of such maneuvers (and these are not all those outside the service by any means) that such ground-troop strafing demonstration is merely training for the ground troops so strafed in the tactics of defense against real aerial attack forces. It is not a possible means of training for the observation crews.

Except for a photographic mapping expedition of Army observation wherein three to five airplanes would be sent out as a flight, it is not expected normally that observation airplanes would function any other way but singly. Nevertheless, a certain amount of formation flying training is carried on as necessary, for the observation airplane might often be called upon to shoulder its camera and accompany a bombing formation to make a record of their raid, or fly along with a friendly and protecting formation of pursuiters for some distance where such protection is fortunately available.

In our Army Air Corps we have the following active squadrons, in the United States and in our foreign possessions:

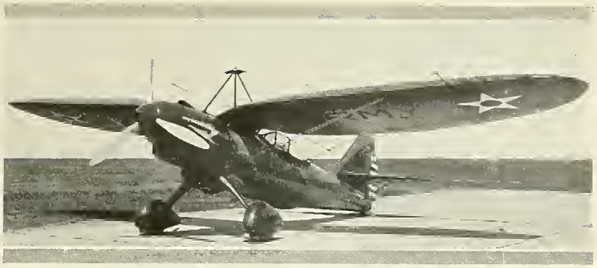
Observation, 14; Attack, 4; Bombardment, 12; Pursuit, 17.

We also have, as has been previously mentioned, 19 National Guard squadrons, all observation, but in comparison with the air organization of foreign powers we should consider only the regular establishment, as the air reserve organizations in other countries are generally more active than ours are, and compare in activity with our National Guard units. France has, in her land-going military aviation, the following squadrons, each squadron being about two-thirds the size of ours:

Observation, 74; Attack, 0; Bombardment, 30; Pursuit, 38.

It thus appears that France has a larger proportion of air service than air force. However, the French reconnaissance airplanes are generally Breguets or Potez machines. The Breguet used for reconnaissance is almost identical with that used for day bombardment, a husky ship with a 480 h.p. Renault or 450 h.p. Lorraine-Dietrich engine. Should we use a predominant number of O-27 (B-8) or O-35 (B-7) long-distance reconnaissance aircraft in our observation units (which we do not do), the cases would be parallel.

There is another interesting angle to their observation aviation. All tactical air units stationed in their colonies are of this type of aviation. It is felt by many military observers that the vociferous humanitarians in the Chamber of Deputies would never consent to the stationing of bombardment units at Oran, Setif, Kassar, Said, Hussein Dey or Beirut. Nevertheless, it is the skill of the observation crews with fragmentation bomb and aerial machine gun which the tribesmen fear, and not the aerial reconnaissance of their positions.



U. S. Army Air Corps photo

Douglas YO-31 Corps Observation gull-wing monoplane

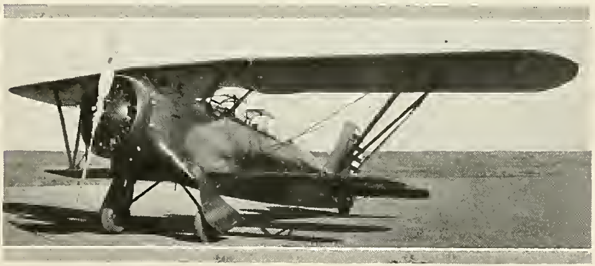
The countries have the following ratio of observation squadrons to totals:

	Observation Squadrons	*Total Squadrons*
Japan	11	21 in Army aviation
Italy	22	103 tactical landplane squadrons

Great Britain's Royal Air Force is predominantly air force, and only five Army cooperation squadrons can be found among the scores of bombing and fighting squadrons in the British Isles. Her home defense auxiliary squadrons are all bombers.

One can discuss the merits of the observation airplanes of other countries and those used by us, but it is almost impossible to estimate their relative merits as a whole. After high speed come other very necessary characteristics which can hardly be gauged by any set standard. How much more maneuverable is the French Potez than the American Curtiss O-39; and because the American Douglas O-31 is far faster and with better vision than the British Armstrong-Whitworth Atlas, can we say that it makes a better observation airplane? For that matter, the O-31 is faster than another and later model American observation airplane, the Curtiss O-40, but the latter has an observer's cockpit which is considered ideal by many observers. Time, and continued use of both these, as well as other makes, will help the observation crew answer the question, "which of all airplanes would you rather use for your work?" We might even hear an objection from the squadron engineering officer who might condemn their choice as an airplane almost impossible to keep in commission.

Therefore are we fortunate in having more diverse models of observation airplanes to choose from than there are in other branches of our military aviation.



U. S. Army Air Corps photo

Latest Curtiss YO-40 Corps Observation sesquiplane

AMERICA AFTER VOLSTEAD

By

Cy Caldwell

I WAS greeted with good-natured tolerance by Horseface Horowitz, President of Amalgamated Armorplated Airlines, Inc. "Where've you been for the last two years? It looks like you ain't kept pace with the progress of aviation since 1933."

"You knew I accompanied Sir Cupid Wilkins to the South Pole as cheer leader?" I reminded him. "Well, I've been two years walking, swimming and wading back. But tell me, how do you who used to be my bootlegger in 1932 become President of an airline in 1935?"

"Well, they repealed Prohibition," said Horseface, as though that explained everything. "Remember Dirty Dave Davosky that ran a gyp joint on Fifty-foist Street? Well, he's Chairman of the Board of the Natural City Bank. Muggsy McGinnis—he had that dive where every second drink over the bar was a Mickey Finn—well, he's President of the New York Stock Exchange now. And I'm tellin' you that under Muggsy the public really gets a chance. No more bum stocks. No sir! Nothin' crooked any more. Straight roulette with a twenty p'cent rake-off for the house. And you know what a disgrace Wall Street used to be? It's been taken care of by old Liverlips Lavinsky—him that used to clean up in the laundry racket in the Bronx. Dog races on Wall Street every day. And not a banker or broker allowed around the course. That keeps dog racing clean, y'know."

"Do you mean to tell me that racketeers are running Wall Street these days?" I asked.

"He's a better janitor than he was airline president"

"What d'yuh mean, *these* days?" repeated Horseface. "What days was they when racketeers wasn't running it? It's a new bunch, that's all. A more honest bunch. Le'me tell you the public won't stand for no gyp games no more—splitting stocks and watering 'em, and all that. Every citizen carries a rod now, and if he thinks he ain't gettin' a square deal he gives 'em the woiks. And everyone's got good aim, too. They practice all the time. Shootin' galleries is our third largest industry."

'But how did all this come about?" I persisted. "Remember, I've been with Wilkins for a couple of years—and naturally my mind is a blank."

"The Democrats carried out their promise; they repealed prohibition. They was the first political party that ever carried out a pre-election promise. The shock was too much of a strain for the country—so it collapsed. Of course in a national emoigency the strong element climbs to the top. Remember the Russian revolution of 1917 and how the Bolsheviks came out on top? They was the strongest and roughest bunch; they could take it. In the United States when it looked like law and order caved in (it had been collapsed for years but few had admitted it) well, when everyone admitted it, the strongest guys which had been sittin' pretty outside the law since 1920 simply took control, bumped off the sissies who'd been depending on cops for protection, and took over all business. Me? I just grabbed myself this airline. There's the former President—that fellow over there with the pail and mop. He's a likable chap, so I made him the new janitor, and he's a better janitor than an airline President—simple soul and happy among his suds."

"Look here, Horseface," I said. "What's the reason for the odd name of your airline—Amalgamated Armorplated?"

"Oh, that stan's for two things: joinin' three or four lines what used to fight each other for business, and putting armor plate on the ships because they used to pop away at each other every day. Now they only do it about once a week to kinda keep in practice. 'Scuse me a second."

He picked up the phone in answer to a ring. "Yeah, this is President Horowitz speakin! . . . Oh, Hossface to you, Spike. What's the good word? Eh? Bullet-proof glass? Well, I want to tell you Spike that I ain't satisfied with your product. You said it would stop bullets, and it didn't. A five-point-nine shell went right through my window. What! You don't guarantee it to stop shells? Then what's the use of it! You know that the Pilots' Union hasn't been using mere bullets since the winter of '34. Now look here, Spike. I know you're a good guy and all that, but if your outfit can't make shell-proof glass you might as well go outta business and we'll armor the windows. I was talking to Spud Spivis of the Shell-Baffle Corporation last night and he says they got a new window shutter that will turn eight-inch shells. So long."

At this moment a man dressed in overalls, helmet, goggles, and wearing a parachute threw open the door and rushed in. "That for you, Horseface!" he shouted, drawing a vicious-looking automatic and firing rapidly at Horowitz who instantly replied with a sub-machine gun mounted on his desk. After a brief exchange of bullets both men stopped and laughed.

"That's a good one on me," remarked the intruder quietly as he slipped his weapon back in his pocket. "I might have known you were wearing your bullet-proof underwear. So am I. Next time I'll let loose with a gas bomb."

"It won't do you no good," smiled Horseface, pointing to a gas mask that was lying on the desk before him. "Now scram! I'm busy. Give my regards to Dave and the boys. Tell them they gotta do better than that."

"Mind if I use the window?" asked the pilot. "A couple of your mugs tried to get tough with me outside and I bumped them. It possibly caused comment in the outer office, and I don't want any trouble on the way out. So long, Horseface. Better luck next time."

"I hope not, I'm sure," murmured Horowitz politely as his visitor vaulted over the sill, pulled out the rip cord, and went sailing down to the street.

"I should fire some scatter-shot through that parachute," mused Horseface, "but I ain't got the heart fer rough stuff no more. That's my one fault—too sentimental."

"Aviation certainly has changed," I commented.

"Well, you gotta expect changes with a change of administration," replied Horseface. "It's all part of the picture of Democratic times. Even Washington has brightened up a bit. Lefty Jake Raskob is Secretary of the Treasury, Primo Carnera is Secretary of State, and Jack Sharkey is Secretary of War. Secretary of the Navy?—Johnny Weismuller. And Mabel Willebrandt is License Commissioner—the best job down there. The California wine growers got it for her out of gratitude. Wait a minute —what's that!"

He leaped from his chair and rushed to the window. Over his shoulder I could see a flight of several mail planes diving toward us, engines roaring.

"That's Dave Behncke and some boys of the line coming over for a conference about salaries," shouted Horseface. "There's their first argument!" A bomb exploded on the roof at the same moment an anti-aircraft battery above us opened fire. "Ah, that's way to answer 'em! Let 'em have it!" Horseface danced about joyfully while the building shook. Bang! Bang! Boom! Boom! BOOM! On went the discussion, first one side and then the other scoring some telling point in the argument.

"Miss Knoodlestein," shouted Horowitz to his charming secretary whom I recognized as a gun moll from Hell's Kitchen, "Get me Dave on the radio."

"Here he is, Mr. Horowitz," screamed the young lady above the din of exploding bombs and shells. At once a voice that I recognized as Behncke's filled the room. . . . "Tune in on this!—And there's more where these came from, Horseface," said the voice.

"Okay, Dave, go get more," replied Horseface. "Not that I mind giving you boys a raise, understand me, but I like the argument and wanna keep it up a while longer. This is great stuff—the real McCoy."

"I've a little surprise for you, Horseface," said the voice. "Stand back from the window."

There was the roar of an engine rapidly coming nearer, then with a shattering of glass the fuselage of a mail plane shot in through the window, leaving the wings outside, banged up against a wall, and stopped in a shower of plaster. Out of it stepped a thin medium-sized pilot and a rather stout one, whom I recognized (despite their padded clothes) as the famous crash expert from the movies, Dick Grace and Dave Behncke. "I had Dick crash me in here," remarked Dave genially as he leaped at Horowitz and felled him with a right to the jaw. "No hard feelings, Horseface," he remarked, "but I really had to get one good crack at an airline operator."

"Your actions is outta order," remarked Horseface, rising to his feet and rubbing his jaw. "But let's call it quits after this," he continued as he gave the President of the Air Line Pilots' Association a swift and unexpected kick in the pants. "I've always wanted to kick a pilot. Now we're even."

"Suppose we let it go at that," said Dave pleasantly. "After all, I've been kicking for years. You're entitled to one kick. And thanks for the enjoyment I received from that sock at your jaw."

"Aw, don't mention it, Dave," laughed Horseface. "The pleasure was almost mutual. You know, after pilots and operators fighting each other in the old days with public relations counsel it does yer heart good to have a go at each other like normal human beans. Y'know, I sometimes think, Dave, that if we'd done that in the old days we'd all been happier."

"You said it, Horseface old kid," laughed Dave. "I suppose we get that raise?"

"Sure you do," replied Horowitz genially. "Any time you want another one let's arbitrate it again, just like this time. By the way Dave, you know old Cy here?"

"Of course," said Dave. "Glad to see you again. How is — Why, where are you hurrying off to so suddenly?"

"Boys," I said, as I hastened toward the door, "I think America in the Democratic era is just swell. I'm going right over to Madison Avenue and take a good soul-satisfying poke at the publisher of AERO DIGEST."

"I've always wanted to kick a pilot. Now we're even"

PERSON.AIR.LITIES

BY

by Caldwell

FROM JANESVILLE, Wisconsin, in the late seventies a young pioneer couple named Hathorn set out in a covered wagon on the trek to their new homestead at Clear Lake, Iowa. Two hundred and fifty miles by ox power was a long journey. For three weeks the young folk toiled on across the prairies, skirting patches of woodland, crossing streams, camping at night, getting up at dawn to push on. Can you picure them? The strong, bronzed young farmer tramping along beside the oxen, his wife sitting in the trundling covered wagon. She would be wearing a dress of cotton print, and her face would be shaded by a poke bonnet; probably he would be wearing corduroys and a hickory shirt. Neither one of them could possibly be thinking that some forty-five years later an old air pilot named Caldwell would be flying the 250 miles in only two hours above that same long trail over which they toiled for three weeks; or that some fifty-three years later he would be sitting down to write a brief biography of their son, not then born. And probably they wouldn't understand how they could be like people out of a romance to me, gallant and splendid in their brave, hopeful youth as they set out to make a home in the wilderness.

Charles Hathorn

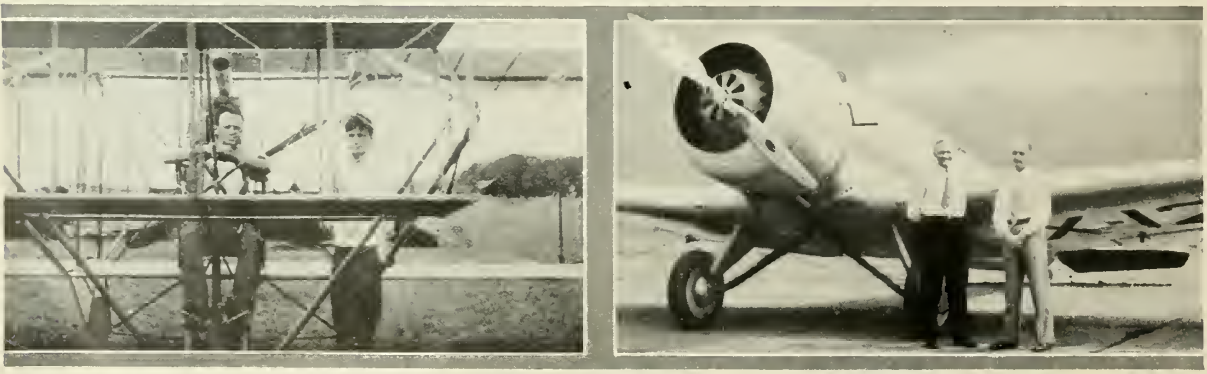
They settled on their prairie farm, and the first building the young husband erected was a granary. There he and his wife lived while he was building their home; and there in the granary, on December 6, 1879, their son was born. He was christened Charles E. Hathorn. He was very rich; wealthy, in fact, with the heritage of strength and character that such parents give their sons. Such riches are permanent, you know, and do not melt away in even the worst of depressions. They prevent a young man ending up in the gutter as a bond salesman, a public relations counsel, or such an awful creature as a Lame Duck Congressman, all of whom apparently are descended either from vaudeville performers or actors in second-rate burlesque shows.

Mr. Hathorn erected a small shop on his farm, where they lived and worked until Charles was ten years old, when his father moved the shop, building and all, to Mason City, Iowa, a small place some ten miles east of their homestead. There he started a foundry and machine shop where Charles obtained many years of practical mechanical experience, working after school and on Saturdays until finally he was putting in ten hours a day, Saturdays included. He did machine tool work, blacksmithing, boiler-making, pattern making, foundry work; and labored on everything from bicycles to threshing machines, on windmills, mowing machines, sewing machines, and any thing that moved mechanically. If he could only see New York's Board of Aldermen, mechanically controlled and run by Tammany Hall, he'd probably want to take them apart. I wish he would and forget to reassemble them.

In 1900 Charles Hathorn, then 21, went to work for the Chicago & Northwestern Railroad, firing locomotives on the Minnesota Division for a year, then went into the burglar alarm business, working on the company's outdoor equipment in Dakota where the temperature was sometimes 40 below zero. By 1903 he was cold enough to move indoors to garage work, where he worked on the early coughers and chokers that went by the name of automobiles. He had the only auto for rent in his town, a 1906 Buick, in which he once drove the sheriff in pursuit of some horse thieves. They searched the country all night, by which time the engine was popping badly, making a noise like a revolver. As he slowed down to cross a bridge the engine was popping worse than ever, and as he turned the car, a voice yelled, "Don't shoot! Don't shoot!" It was the horse thieves surrendering to an early Buick in full blast.

He built a cycle car, raced it for a season, skidded through a fence, and in 1911 turned to aviation. From sketches of an airplane he had seen in an automobile magazine he built a plane for himself, toted it out to a field behind the county poor farm (an appropriate place for an early aviator) and from there made his first flights. The only flying knowledge he had was that he had watched Glenn Curtiss fly at Minneapolis the year before. Lucky he was watching Curtiss, not Ruth Nichols, or he'd still be trying to get off.

On his first flight he ran over a pop bottle (he *says* it was a pop bottle) and punctured a tire. Had to wait a week for a new tire to be sent from Chicago, went off again, flew over a haystack, encountered a down draft, and lit on one wing, ignoring the undercarriage. He was now actually in aviation, having taken off, crashed, and been able to walk away from it. This was practically the same as getting a Transport License back in 1911; he was now officially rec-



Then and now: C. E. Hathorn seated in his plane in 1911, and W. K. Jay (now of the Northrop Corp.); and the same two today

ognized as an aviator, as the species were quaintly referred to at that time, and columns in the newspapers were devoted to him.

And here is where that solid pioneer ancestry came to his rescue. Instead of becoming an exhibition flyer and never amounting to much thereafter, the steady Charles kept right on with the old garage until 1914 when he sold it to work for the Pierce-Arrow Co. He had previously sold the pusher to some one not as smart as he was, and thus definitely marked himself as a man of intelligence.

These bright doings lead us to 1919 and the Curtiss Co. at Garden City, where, toiling over motors as a mechanic, we find the old pilot. But not for long. Soon he had been promoted to the Engineering Department as Design Engineer, and was working on the development of the Reed metal propeller. He and Casey Jones did much of the flight testing of this notable product. Then he was project engineer on the plane for the first coast to coast flight from dawn to dusk, accomplished by Lieut. Maughan in 21 hours and 47 minutes. Also he was project engineer on the plane that Capt. Roald Amundsen took with him to the Arctic Circle, and later project engineer on the Curtiss Helldivers, which, by the way, he named.

During all this time the hard working descendant of pioneers was flying whenever he could, though he didn't go solo on any of the modern ships. He has flown with Clifford Webster, Dick Depew, Casey Jones, Jim Ray, E. P. Lott, Ed Ronne, Leslie Irwin, Bill MacMullen and many others, including Bert Acosta. Bert dropped the ex-blacksmith and threshing machine expert down in the Connecticut hills one day. And when they stepped out of what remained, the ship looked as though it had gone through a threshing machine itself. They took out the engine, set fire to what was left, and walked away from it.

Charles Hathorn is still project engineer with the Curtiss Aeroplane & Motor Company at Buffalo. He holds the distinction of being one of the few who have not joined the periodical graduating classes of that grand old company. He has clung to them like a limpet all through the depression that has jarred loose so many good men and true. This tenacity I attribute to his pioneer ancestry. Anyone who could survive farm life in pioneer Iowa can be guaranteed to go through almost anything without being shaken out.

* * *

LEE D. WARRENDER is Chief Instructor and General Manager of the Casey Jones School of Aeronautics at Newark, N. J. He let out his first howl at Anderson, Indiana, August 4, 1897, and if he'd known he was to become an instructor he might have howled even louder. He grew up in Anderson spending much of his time in the excellent manual training school, where he became such an expert mechanic that he built a glider that wouldn't glide, thus sparing his life. After a year at Purdue University to acquire polish, he worked in automobile factories as a pattern maker, tool maker and designer until the war. He enlisted as a private in the Signal Corps, and arrived at Kelly Field in July, 1917, when the Field boasted but three airplanes and practically no flying field. Here he labored while he applied for flying training, and passed his examinations brilliantly by answering "yes" to one question: "Are you familiar with the Hall-Scott airplane engine?" He was the only Signal Corps recruit to whom the engine was not a deep, dark mystery, so they sent him to the Ground School at Austin, Texas, where the classes were held in a former institute for the blind, with daily exercises in front of a hospital, and drill in a graveyard. This system gave the boys a slight idea of what they were in line for.

Lee D. Warrender

He ended his Ground School period as a drummer beating the cymbals in the Corps band, and it's a wonder he didn't turn out to be a public relations counsel. The only thing that saved him from that fate was that he couldn't toot a horn. He was posted to Carlstrom Field, where Colonel, now General, Jim Fechet was holding forth in solitary glory. Lee was the first officer to be commissioned at Carlstrom after 25 hours of flying, and was sent to the Sheep Pens at Dallas to await shipment to Europe with the next batch of mules and pilots, most of whom were rounded up at Dallas, branded, fed, watered, and loaded aboard ship with enough hay and oats to last them until they hit France.

Complete with his 25 hours and an ambition to rise, Lee Warrender arrived at Issoudun and saw two of the chief features of America's war in the air—a Nieuport and Casey Jones, in person. Old massa Jones was the Assistant Officer in Charge of Training, Third Aviation Instruction Centre, Issoudun, and a man of vast importance to youths with but 25 hours. Somewhat awed by this Personage, Lee went up in a Nieuport and put up such an exhibition that the experts concluded he needed something heavier than a Nieuport, so they sent him to Tours on Caudrons. There is more to break on a Caudron before the full force of the impact reaches the young pilot. Lee Caudroned for another 25 hours, celebrated his graduation in Paris after a manner approved by the oldest and best flying officers with 50 hours, and woke up next morning to discover that he had missed the train on which his fellow-pilots had departed, headaches and all, for the Front and glory. The Army, enraged at this tardiness, hurled Lee into a night-flying squadron, where there is absolutely no glory but a lot of dirty work at dead of night. That's what I also did in the war, so I know that night bombing was only a little less monotonous and hardly more dangerous than digging latrines. It's the pursuit pilot wot gets the glory, and the bomber wot gets the blyme, as an English mechanic of vision once told me.

Lee flew nights during the St. Mihiel Drive, and only had one forced landing, much to the annoyance of two trees that failed to survive his attack. He was carrying a full load of bombs which didn't explode, or I'd have been saved the trouble of writing this. Well, along came the Argonne Offensive where every pilot was needed, day and night, according to the bold General Billy Mitchell. From the comparative safety of enshrouding darkness, Lee was hurled into the air during the full light of day. A Hun saw him, shot him in the back of the neck, killed his observer, and drove the ex-night bomber down near Montfaucon, from which hamlet he departed at top speed when he discovered that shells were dropping around him. He ran south until he was stopped at a first-aid station, his wound dressed, and himself placed on a train to carry him out of the war, as he thought. In two weeks they had his neck almost as good as new, except that it wouldn't swivel, and much to his consternation he found himself returning to the fray. However, the doctor at the squadron decided that a pilot who could look in only one direction, and that straight ahead, would be slightly handicapped if a Hun approached from the side, so Lee was sent to Nice and Monte Carlo to see if he could limber up that neck of his. By keeping eyes front at all times, he managed to leave it immovable until the Armistice rang out. One bullet in one man in one war was enough, with something even left over. Very appropriately he was posted to the Peace Commission in Paris, which I am sure he deserved. Then home, to complete his education at Purdue University, then to M. I. T. in Boston to imbibe at the fount of engineering wisdom presided over by my good friend Professor Edward P. Warner, now degenerated into the editorship of an ob-

(*Continued on page* 58)

AT THE AIRPORTS

South Bend Airport Is Moved

WORK OF REMOVING the South Bend, Ind., municipal airport from its present location northeast of the city to the Bendix tract, west of the city on US-20, was being resumed recently in South Bend, Ind., following a court decision which dissolved a temporary restraining order filed by the owner of the land on which the old airport was located.

The suit demanded damages from the city for the destruction of part of the farm land, made necessary by the erection of steel hangars on concrete foundations, and claimed that oil from pumps and airplane engines had saturated the soil and destroyed it for agricultural purposes. The question decided upon by the court was whether the hangars and other airport properties became a permanent part of the land when they were built by the aviation commission. The court's decision gives the city commission complete right to remove all of its properties with the exception of plumbing and other improvements installed in a farmhouse on the property. The ruling declares that hangars are only temporary improvements and can be moved when the tenant on the property moves.

Two hundred and twenty-six airplanes stopped at the airport during the month of November, it was shown in a report last month by Glenn Borror, airport manager. Forty-four passengers departed, and there were forty-one arrivals. A total of 1,008 through passengers passed through the airport in November as compared with 1,002 in November, 1931.

Jacksonville Hangar Started

THE CORNERSTONE for a new municipal hangar costing $16,000 was laid at Jacksonville, Fla., on December 10. Maj. H. A. Maloney is airport manager.

Air Service Takes New Dealerships

THE NORTHWEST AIR SERVICE, INC., Boeing Field, Seattle, Wash., has completed negotiations for authorized dealership of Pratt & Whitney parts. A new contract with the Goodyear company makes this concern agent also for Goodyear tires and airwheels. The Northwest Air Service has served the Northwest for some time as authorized dealer and service station for Wright, Kinner, Eclipse, Bendix, Stromberg, Scintilla and Berryloid.

Company Takes Over Flying Activities

COMMERCIAL FLYING ACTIVITIES at Curtiss-Reynolds airport, Glenview, Chicago, Ill., were leased, effective December 1, to the North Shore Airways of Waukegan, Ill. Murray Boess and C. L. Clabaugh head the North Shore Airways. Dwight Morrow, formerly chief pilot for Curtiss-Reynolds flying service, will be retained as instructor. The Curtiss-Wright method of training will be maintained. The new company will give flying instruction and conduct a general commercial flying business, including taxi service at the field and short passenger flights.

Ralph J. Hall, formerly Curtiss-Wright manager at the Denver base and Alameda, Calif., is the present manager of the Chicago field. Curtiss-Wright retains control of the airport supply store, repair shops and all base activities except flying.

Parachute Service at California Field

UNITED AVIATION AND PARACHUTE SERVICE has opened at United Airport, Los Angeles. Jointly associated in the new company are Bill Dodson, Irvin Airchute representative, and Jack Waterhouse, formerly of Spicer-Santry. Besides parachute repair, overhaul, packing and rentals, this concern also handles engine and plane repair, plane storage and student training.

Dinner Key Base Improvements Begun

CONSTRUCTION of bulkheading at a cost of $50,000 as part of a $330,000 improvement program by Pan American Airways was scheduled to be started last month at the Dinner Key, Fla., seaplane base. The City of Miami will bear $20,000 of the cost.

Items of the airway's improvement program include a $135,000 passenger terminal building, grading, road paving and landscaping to cost $25,000, and a $120,000 government channel to be dredged to deep water.

Traffic at Oakland Increases

OAKLAND MUNICIPAL AIRPORT, Calif., recorded 6,419 landings during November, of which 4,457 were by student planes. Passengers totalled 2,381. These figures show gains over those for October.

Final preparations have been made at Oakland (Calif.) Municipal Airport weather bureau preparatory to the inauguration of a system of transmitting weather maps by teletypewriter.

Rhode Island Airport Weather Bureau

AN OFFICE of the United States Weather Bureau will be established at the Rhode Island State Airport at Hillsgrove within the next few weeks, it was announced recently. The bureau will operate under the East Boston office and will not conflict with the Providence Bureau. Observations and service will be restricted to daytime only until night flying is started at the airport.

Florida Managers to Organize

A MEETING of thirty-eight Florida airport managers will be held at Miami January 5-7 to organize a state association to regulate rates, improve service and promote air travel.

Caribou Field Made Port of Entry

THE MUNICIPAL AIRPORT at Caribou, Me., has been designated as a temporary port of entry for a one-year period.

Michigan Urges Airport Work Progress

THE MICHIGAN STATE BOARD OF AERONAUTICS is advocating the use of unemployed labor to improve present aeronautical facilities throughout the state. Among projects to be pushed under the plan are the improvement of forty airports in need of such work, the development of new landing fields and the airmarking of 200 towns.

Demonstration at Roosevelt Field

SUCCESSFUL FIRE-EXTINGUISHING demonstrations were given last month at Roosevelt Field, Long Island, N. Y., with equipment of the Du Gas Fire Extinguisher Corp. and the Walter Kidde Co., both of New York City. Gasoline and oil fires were quickly put out through use of the equipment under the direction of a member of the Garden City Fire Department and Albert W. Price of Roosevelt Field.

United Uses Oil-Saving Device

AN OIL RECLAIMER has been installed and is now in operation at the Cheyenne base of United Air Lines. This machine is capable of reclaiming approximately 225 gallons of used oil each twenty-four hours. The reclaimed oil, when subjected to laboratory test, has practically the same specification characteristics as new oil.

Hospital Unit to Furnish Air Service

HEADED by Dr. Ross Sutherland, flying physician, five Burbank surgeons have installed a hospital unit at United Airport, Los Angeles, Calif. This group is to provide for suburban cities airplane ambulance facilities and connections with the metropolitan hospitals. Ground ambulances, first-aid facilities, a surgeon and nurse are in attendance constantly at the airport for emergency calls.

Alabama Field Finished

THE NEW GOVERNMENT AIRPORT which will serve as an emergency field at Tuscaloosa, Ala., has been completed and put into operation. George Skinner has been appointed manager of the field, which is located adjoining Manor Field.

Tampa to Buy Airport Site

THE CITY OF TAMPA, FLA., will buy for $11,854 the area used as a municipal airport. The tract comprises 160 acres and has a hangar, machine shop and office buildings.

Airport Flying Activities Transferred

O. J. WHITNEY, INC., has taken over the flying activities, including the flying school, at the Glenn Curtiss Airport at North Beach, N. Y. The Curtiss-Wright Corp. is confining itself to sales and service at the field.

Safair Conducts Valley Stream Flying

SAFAIR, INC., of which O. P. Hebert is president, has taken over flying activities at the Curtiss Valley Stream Field, Long Island, N. Y. These include the flying school and the ground school work at New York University as well as charter and taxi service. Curtiss-Wright Airports Corp. is retaining sales, storage and servicing of planes at the field.

Companies Open at Roosevelt Field

HOWARD T. AILOR has leased Hangar 16 at Roosevelt Field, Long Island, N. Y., as headquarters of his company to distribute Waco airplanes in southern New York and part of Connecticut. The hangar is being redecorated and the office space is being enlarged. Airplanes will be exhibited in a showroom. Mr. Ailor has been national representative for the last five years of Waco Aircraft Co., Troy, Ohio.

George McCauley has organized the Aeronautical Radio Co., which will make Roosevelt Field its headquarters. H. E. Parks, licensed radio operator and experienced radio repair man, is associated with Mr. McCauley, who also is a licensed radio operator, a transport pilot and a licensed airplane and engine mechanic.

New Airport Near San Francisco Urged

PLANS for obtaining legislative action to promote the establishment of an air terminal on Yerba Buena island in San Francisco bay were made at a series of meetings held in San Francisco during the early part of last month. The main purpose of the meeting was to draw up a bill by which the state will cede the title on approximately 300 acres of the shoal land to the city of San Francisco. This bill is to be presented when the state legislature meets in January.

Club Organized at Valley Stream

THE "TAIL WIND CLUB" has been decided upon as a name for the organization of private plane owners and operators at Valley Stream, N. Y., airport. The purpose of the club is to promote social and flying activities among the members on a non-commercial no-profit basis. Elwood Keim has been elected president and Everett Moniz, vice president. Other officers include Peggy Remey, secretary-treasurer, and A. J. Bentley and James C. Gann, directors. "Casey" Jones is an honorary charter member.

Improvements at North Carolina Port

ANNOUNCEMENT has been made by Robert Turner, new manager of the Asheville-Henderson, N. C., airport, that the field is to be developed to the point where it will receive the government A-1-A rating. Twelve and a half acres of land on the western side, behind the hangar and machine shops, were accepted in exchange for eighteen acres on the northwest side that bordered Cane Creek and were subject to flooding. The new land will provide space for two more runways, and possibly bisecting runways. The port, when the alterations are completed, will have east-and-west, north-and-south and southeast-and-northwest runways, all of them two-way strips.

Due to the resignation of Dexter Martin, former chief pilot of the port, Ed Buyck has been selected to fill that position. Buyck has over 2,500 hours to his credit and served the same airport in his present capacity when it was under the management of T. J. Roberts.

Trans-Atlantic Flier Manages Airport

JOHN POLANDO of Lynn, Mass., has been made operations manager of the Lafayette Airport near Portsmouth, N. H. In 1931 he flew to Istanbul, Turkey, from New York with Russell Boardman, setting a new world distance record.

Texas Field to Be Opened

A COMPANY is to be organized in Floresville, Tex., to be known as the Floresville Airport, Inc. Plans include an airport and flying school under the management of Allen Franklin, licensed pilot. The new airport will be modern and fill a long needed requirement of this section.

Pacific Coast Airport Proposed

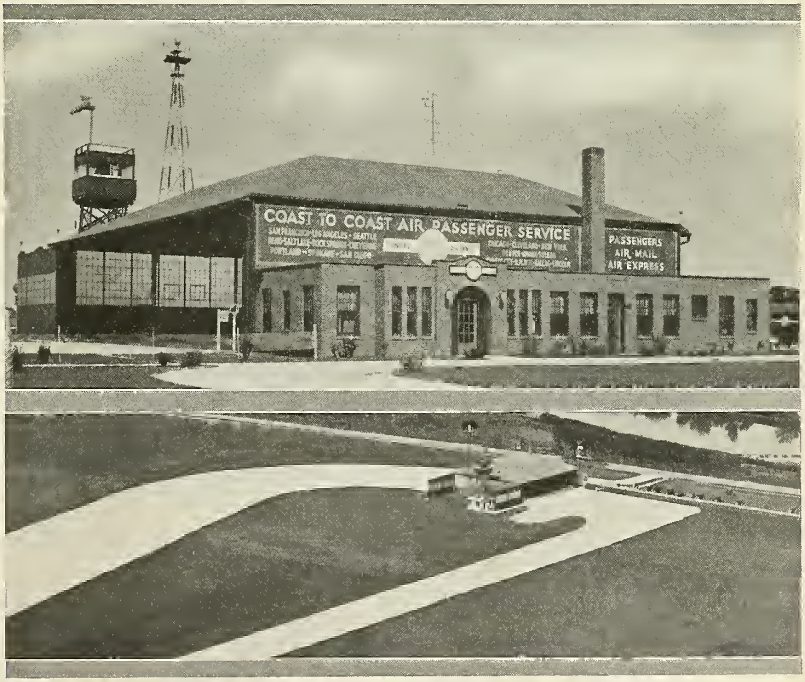
PLANS have been outlined for a large combined air and sea port near Raymond and South Bend, Wash., which would be used for commercial airplanes of the Northwest as well as for an aid to national defense. The Department of Commerce will lend aid towards its establishment, it is reported.

New Manager at Coatesville, Pa.

LOGAN M. KELLY, formerly with Sky Haven Airport, Malvern, Pa., is now manager of Coatesville (Pa.) Airport. Philip Harmon, formerly an instructor at Dallas Air College, Dallas, Tex., has joined Kelly and will serve in the same capacity at the Pennsylvania airport.

Officers of Watson Airport Named

COMDR. J. H. KLEIN, JR., has been chosen president of Watson Airport, Inc., Cincinnati. Parks Watson has been made vice president; H. Lynn A. Barber, secretary and treasurer, and Allen Joslin, C. W. Deforest, Andrew Lowdder and Hugh Watson, directors.



United Air Lines hangar-depot, located at the municipal airport, Iowa City, Iowa. The lower view, taken from the air, shows the unusual runway layout

• PRIVATE FLYING •

Winter Aviation Cruise Features Race

AT LEAST forty sportsmen pilots in the eastern states are expected to take part in the Second Annual Winter Aviation Cruise to Florida, and over twenty in a 240-mile handicap race en route, according to John S. Reaves, head of the United States Amateur Air Pilots' Association. The cruise is to start January 3 from the Aviation Country Club at Hicksville, Long Island, N. Y., and to proceed by easy stages to Miami.

A new event in this year's winter cruise will be the race, to be held over the last lap of the course, between Daytona and Miami, for a cash purse of $2,500 and the possession of the Henry L. Doherty Trophy, both of which have been given to the organization by Henry L. Doherty, president of the Florida Year-Round Clubs. The event will be called the Florida Year-Round Clubs Handicap Race. Mr. Doherty has extended to all participants in the cruise the privileges of the clubs, including Key Largo Anglers, Miami Biltmore Country and Roney Plaza Sun Cabana, and the fliers will be guests of the Florida Year-Round Clubs at the Miami Biltmore.

Plans for the cruise call for a rendezvous at the Aviation Country Club at Hicksville, Long Island, N. Y., January 3, the main flight squadron being scheduled to take off there at 10 o'clock that morning. Several prominent sportsmen air pilots, including many of the eastern governors of the association, are organizing state flight squadrons which will meet at some centrally located airport in the various states and then join the main flight squadron either at Hicksville or one of the control stops, which will be Washington, Greensboro, N. C.; Augusta, Ga.; Jacksonville and Daytona, Fla. The first night stop will be made at Richmond, Va., and the second at Jacksonville, the squadron reaching Miami the third day. The handicap race and the cruise are open to both men and women amateurs whose standing has been authenticated by the association.

The Florida Year-Round Club Handicap Race is scheduled to leave the Daytona Airport at 1:30 p. m. on January 5. Each airplane will be handicapped at the manufacturer's advertised top speed, the ships with the lower speed taking off first, so that the first ship in at the finishing line, the Miami Biltmore tower at Coral Gables, will win first place. The winner will receive permanent possession of the Doherty Trophy and a $1,000 cash prize; second place, $500, and third place, $250. The next fifteen place winners will receive fifty dollars each as consolation prizes. After crossing the finishing line the planes will fly to the Miami Municipal Airport, where the Miami Air Races are scheduled to start on January 5.

The contest committee of the association, under whose direction the cruise and race will be flown, are A. Felix du Pont, Jr.; Eric Wood, F. William Zelcer, Lawrence Turnure, Jr.; John S. Reaves, Maurice Ames and Jessamine Goddard.

Among the governors of the organization, who are planning participation by their state groups, are: Luis de Florez, governor for Connecticut; John Candler, for Georgia; Olcott S. Payson, for Maine; Henry B. du Pont, for Delaware; Allen Rushton, for Alabama; John W. Lasell, for Massachusetts; Gordon Brown, for New Hampshire; Charles B. Griner, for Florida; A. Henderson McLean, for Maryland; W. Lawrence Saunders, 2nd, for Pennsylvania; James B. Pierce, Jr., for West Virginia; Charles M. Taylor, 2nd, for Arkansas Edmund F. Ball, for Indiana; Robert A. Wellons, for North Carolina; Walter Amory, for Rhode Island, and George W. Noland, for Tennessee.

Flying Explorers Off on Trip

MR. AND MRS. MARTIN JOHNSON, explorers, were scheduled to sail late last month for Nairobi, Africa. The expedition will take pictures in Southern Abyssinia, and airplanes are to be used to penetrate into some unexplored areas.

Pilots Fly More Than 5,000 Hours Each

FIVE PERSONS holding active private pilots' licenses have flying logs showing more than 5,000 hours in the air; three industrial pilots report more than 1,000 hours each, and two limited commercial pilots, more than 2,000 hours each, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, has announced. A substantial number of other pilots in the license grades mentioned have flown more than the minimum necessary to secure licenses and renew them periodically, and many report flying time in excess of the 200 hours necessary for eligibility to apply for a transport pilot's license.

Private pilots with 5,000 hours' or more flying time are the following: George A. Howard, Montpelier, Vt.; Joseph P. Bauer, Franklin, Pa.; Charles H. Day, New York City; Roy W. Peacock, Laguna Beach, Calif., and Lawrence W. Brown, Los Angeles, Calif.

Industrial pilots with 1,000 hours or more flying time are Robert Simon, Farmingdale, Long Island, N. Y.; William W. Genero, Colfax, Wash., and Alfred Dreyer, Indianapolis, Ind., while limited commercial pilots with 2,000 hours or more flying time are John W. Hackbarth, Idaho Falls, Ida., and Willibald Scypelt, New York City.

Rhode Island Club Gains Recruits

FORTY Rhode Island State College students joined the Aero Club of the college last month at its reorganization meeting. The club was organized last spring. One of the features of the program for this year is a ground course, lectures for which are under way. Lloyd Crandall is president; Alvin Butterfield, vice president, and George McCahey, secretary-treasurer.

Air and Hunting Trip Combined

DUCK HUNTING in western Oregon, pheasant hunting in eastern Oregon and an airplane trip of 420 miles were combined in a single day recently by Portland sportsmen. The men bagged their limit of ducks in the early morning near Portland, flew 420 miles by plane east to Ontario, Ore., and then shot their limit of Chinese pheasants.

Sandbag Bombing Contests Begun

A SERIES of sandbag bombing competitions was to be instituted by a group of sportsmen pilots and private airplane owners recently at College Park Airport, Md. The contests are scheduled to take place Sunday afternoons during the winter.

Pilots are given six bombs with streamers bearing his contest number. Using a 100-foot white circle with a three-foot bullseye painted on the surface of the airport as a target, each flier is allowed one practice shot and five scoring drops. A minimum altitude of 500 feet is permitted, and contestants must fly solo. Prizes are aviation gasoline for those with the highest scores.

Mrs. Roosevelt an Aviation Enthusiast

MRS. FRANKLIN D. ROOSEVELT, wife of the President-elect, has proved herself a confirmed traveler by air recently, when in the course of required journeys she flew by air rather than ride in slower vehicles of transportation. Several weeks ago she organized a party to fly over New York City at night. The flight was made in one of the Curtiss Condors of Eastern Air Transport.

Pennsylvania Clubs Plan Trips

MEMBERS of the Pylon Club, Norristown, Pa., and the Philadelphia Aviation Country Club have been contemplating a series of Sunday excursions to various points of interest in the vicinity. Other sportsmen pilots are expected to join in the flights. Among outings proposed are a duck-shooting trip and a visit to Lakehurst. Several of these flights have already been undertaken by the group.

• AIRLINES and AIR TRAVEL •

Sixteen-Hour Transcontinental Service

TRANSCONTINENTAL and Western Air time schedules between California and New York will be reduced almost one-third to sixteen and eighteen hours early next spring, according to an announcement made last month by H. W. Beck, traffic manager. This will be accomplished by two new types of Northrop and Douglas transports. The mail and express planes will exceed 200 miles per hour, cutting the present schedule of twenty-two hours and forty-two minutes to slightly more than sixteen hours. The new passenger transport, designed to exceed 160 miles per hour, will reduce the present schedule of twenty-four hours and forty-two minutes to about eighteen hours.

The mail planes will be all-metal, low-wing Northrop monoplanes, powered with single Wright engines of 700 horsepower. With a fuel capacity sufficient for more than 1000 miles, only three stops will be necessary between the Atlantic and Pacific coasts. These transports will be almost identical with the ship recently completed for Frank Hawks and will have the huge flap that is hinged to the bottom side of the trailing edge of the wing by which the pilot can slow down from full speed to a stop in a few hundred feet.

The passenger transport will be an all-metal, low-wing Douglas monoplane with two Cyclone engines, each of 600 horsepower. The cabin will be sufficiently large for twenty ordinary seats but will be equipped with only twelve reclining chairs to allow increased comfort for the passengers and the carrying of a ton or more of mail and express.

United Passes Fifty Millionth Mile

COMPLETION of the fifty millionth mile of travel by planes of the United Air Lines was celebrated last month at the San Francisco Bay Airdrome upon the arrival of the San Diego trimotor plane on its daylight flight to Seattle. Flights of the last twelve months totaled fifteen million miles.

Aviation Firm Changes Executives

RICHARD F. HOYT was chosen last month as president of the Aviation Corp., succeeding LaMotte T. Cohu, who retired from the presidency but retained his place as a member of the board of directors. At the same meeting Lester D. Seymour was elected president of American Airways, subsidiary of the Aviation Corp.

Shortly after his taking office, Mr. Hoyt announced that the directors of the Aviation Corp. had approved the purchase of Transamerican Airline Corp., of which the Cord Corp. had previously obtained control. The Cord Corp. is headed by E. L. Cord of Auburn Automobile and Stinson Aircraft fame, a director of the Aviation Corp. Mr. Cord also has bought the New York-Buffalo Martz Airlines and has been reported as negotiating for a large interest in Northwest Airways, Inc.

Mr. Hoyt is chairman of the board of directors of the Curtiss-Wright Corp., of Wright Aeronautical Corp. and of the Thompson Aeronautical Corp. as well as a director and member of the executive committee of Pan American Airways and a partner in the firm of Hayden, Stone & Co. Mr. Seymour, new president of American Airways, is a former vice president of National Air Transport and of its parent company, United Air Lines.

The directorate of the Aviation Corp. has been reduced to seventeen members. In addition to Mr. Hoyt the new directors include Frank A. Vanderlip, former president of the National City Bank of New York; C. C. Conway, chairman of the board and of the executive committee of the Continental Can Co.; R. S. Pruitt of Chicago, general counsel for the Cord Corp.; C. Coburn Darling, Lindley C. Morton of Birmingham, a director of the Freeport (Tex.) Sulphur Co. and of the Manufacturers Trust Co. of New York; Charles L. Lawrance, a director of Transcontinental Air Transport; M. C. Meigs of Chicago, and Matthew S. Sloan, former president of the New York Edison Co.

Besides Mr. Cord and Mr. Cohu, members of the old board who have been retained as directors include L. B. Manning, executive vice president of the Cord Corp.; Robert Lehman, former chairman of the board; W. A. Harriman of Brown Brothers, Harriman & Co.; Amon G. Carter, publisher of *The Fort Worth Star-Telegram;* George R. Hann, president of Pittsburgh Aviation Industries and chairman of Pennsylvania Airlines, and Lyndol L. Young, a Cord attorney, of Los Angeles.

Messrs. Seymour, Young, Manning, Hoyt and Graham B. Grosvenor, former president of Aviation Corp., have been chosen as directors of American Airways.

New England Air Service Opens

FIFTY-MINUTE charter service between New York and Hartford, Conn., was started December 12 by Clarence Chamberlin preliminary to the establishment of an airline to other New England cities. A fleet of Lockheed planes will be used by the Chamberlin organization, it has been announced, and after their delivery it is expected to expand the air service to include Boston, Providence, New Haven, Springfield and Albany. Passengers as well as freight will be carried.

Three seven-passenger Chamberlin cabin planes are used at present on the route to Hartford, one trip being made daily. The New York terminus is at Holmes Airport, Jackson Heights, Long Island, N. Y., and connection is made with the transcontinental express service of the Air Express Corp. having its eastern terminal at Floyd Bennett Field, Brooklyn, N. Y.

Safety of Air Mail Flying Proved

ONLY one pilot was lost for every 2,300,155 miles flown, according to the Post Office Department report for the fiscal year, ending June 30. Mail destroyed by fire in crashes amounted to .000151 of the total poundage, and the cost per mile of transporting it was lowered to sixty-two cents as compared with seventy-nine for the preceding year.

Two new air mail routes will be added to the national system this year. These will be the Boston-Albany division of American Airways and the Milwaukee-Detroit line of Kohler Aviation Corp.

Pan American Orders Ocean Planes

PAN AMERICAN AIRWAYS has let two contracts for complete engineering work, covering two types of ocean transport airplanes, to the Sikorsky Aviation Corp. of Bridgeport, Conn., and the Glenn L. Martin Co. of Baltimore, Md. The planes will be capable of transporting commercial loads non-stop across the Atlantic and Pacific oceans, or a distance of at least 2,500 miles, and will have a capacity of fifty passengers, mail and express over international routes now operated by Pan American across the Caribbean Sea.

Both models are to be all-metal high-wing monoplane flying boats, carrying four air-cooled radial engines streamlined into the leading edge of the wing, and to be known as the Sikorsky S-42 and the Martin M-130. No detailed specifications have been made public regarding the ships, but it is reported that they may be ready for flight within two years.

In general, the Sikorsky will resemble other Sikorsky planes with the exception that it will be of the long-hull type, in contrast to the usual short-hull type with the tail carried on outriggers. The Martin will be similar to the Martin P3M-1's built for the U. S. Navy and will have a higher prow and tail than the Sikorsky. Sponsons extending out from the hull will give additional flotation. It is reported that speeds of the planes will exceed 125 miles per hour.

Texas Line to be Opened

A CONTRACT has been signed by W. T. Pittman and associates of Dallas, Tex., with officials of the city of Tyler, Tex., and owners of the Tyler airport for the inauguration of passenger service between Dallas and Tyler. Two trips each way will be made daily, and connections will be made with passenger planes flying north, east and west out of Dallas. Tyler is the center of the East Texas oil district.

Northwest Airways Changes Schedule

THROUGH air mail and passenger connections from Winnipeg, Bismarck and Duluth to Chicago by way of Minneapolis have been made possible under schedule changes placed into effect by Northwest Airways, Inc.

On the Twin Cities-Winnipeg line, departure time from Winnipeg has been advanced from 12.40 p. m. to 10:50 a. m., with arrival in Minneapolis at 3:20 p. m. Departure time from Bismarck has been advanced from 1:00 p. m. to 11:10 a. m. This plane connects with the southbound Winnipeg ship at Fargo at 1:20 p. m. Southbound planes on the Duluth-Twin Cities run will leave at 1:45 p. m. instead of 3:00 p. m. All these planes will connect with the afternoon plane to Chicago at Minneapolis. The departure time out of the Twin Cities has been delayed fifteen minutes, now leaving St. Paul at 3:15 p. m. and Minneapolis at 3:30 p. m., with the same arrival in Chicago, thereby giving faster service.

Stuart F. Auer has been appointed traffic manager of the newly created Milwaukee division of the company, according to Croil Hunter, general traffic manager. The Green Bay line and adjacent territory will be included in the new division, previously handled as part of the Chicago division of the firm. The volume of air mail, passenger and air express business that is developing makes a separate division necessary, Mr. Hunter said.

Radio Improved on United Lines

COMMUNICATIONS engineers of United Air Lines have developed radio telephone equipment whereby it is possible for pilots in flight to change radiophone frequencies by pulling a lever. Formerly it was not possible to shift from day to night frequency while in the air, as the adjustment required use of tuning coils to bring the apparatus to maximum sensitivity and volume. New type superheterodyne radiophone receivers are being installed on all mail-passenger-express planes of United Air Lines to provide improved and more selective reception of radio telephone reports.

Radio telephone communication between airway radio stations and pilots of United Air Lines planes in flight is now being regulated by dialing numbers to obtain the desired wave lengths, following perfection of an aircraft radiophone switchboard system by United's communications department. The new system enables airport radio operators to change their receivers, which are located several miles from the airports, by remote control to one of the several frequencies used by United planes. When an operator has been conversing with the pilot of one plane and wishes to communicate with another airliner using a different wave length, he dials the proper number, and the necessary shift is made automatically, giving the proper frequency as well as the desired volume. The new system is now in operation at practically all of United's thirty-six ground stations on the company's New York-Chicago-Pacific Coast and other mail, passenger and express routes.

American Airways Adds Peoria As Stop

PEORIA, Ill., again has air transport facilities for mail, passengers and express since American Airways, Inc., inaugurated new schedules on its Chicago-Springfield-St. Louis-Memphis-New Orleans route last month. Peoria, one of the first cities in the country to have air mail service, has been without service for several months during the period of construction work on the municipal airport.

American Airways has advanced its 8:30 a. m. departure south out of Chicago to 8:05 a.m., arriving in Peoria at 9:22 a. m., Springfield at 10:10, St. Louis at 11:03, East St. Louis at 11:33, Memphis at 1:55 p.m., Jackson at 4:19 and New Orleans at 5:50 p.m. Northbound, planes leave St. Louis at 5:05 p.m., arriving in Springfield at 5:57 and in Peoria at 6:43 p.m., going on to Chicago and points east and west.

Rail-air service between Mobile, Ala.; Chicago, St. Louis, Kansas City and other Mid-Western cities has been inaugurated through a tie-up with American Airways and Gulf, Mobile and Northern railroads. Train service can be used from Mobile to Jackson, Miss., where plane connections are made.

Air Express Office at Chicago

WITH AN INCREASING volume of air express now being dispatched from Chicago, an air express office has been established at the Chicago municipal airport by the air express division of the Railway Express Agency. Incoming and outgoing express shipments on United Air Lines and Northwest Airways will be handled at this office.

Hotels Inaugurate Giro Taxi Service

AUTOGIROS are being used as taxis by the Miami-Biltmore Hotel at Miami, Fla., and the Roney-Plaza Hotel at Miami Beach. The machines are operated on a scheduled shuttle service.

Airline to Run Easter Excursions

EASTER WEEK-END, April 14-16, United States Airways, Inc., will operate round trips between Kansas City, Mo., and Denver, Colo., at special excursion rates. The return limit is extended to thirty days. The airline operates a route between Kansas City and Denver with stops at Salina and Goodland, Kan.

Missouri Airline Started

A SPRINGFIELD-JOPLIN-KANSAS CITY daily air service has been established by the Ozark Airways, Inc., of Springfield, Mo., to make connections with transcontinental airlines at Kansas City, Mo. G. M. Prescott of Springfield is president and general manager of the company. M. E. Sellers is traffic manager, and R. C. McCrum is traffic representative at Joplin Airport. A three-passenger cabin plane is being used at first, but a twelve-passenger ship will be used as soon as the load requires it. The airline has taken over the management of the municipal airport at Springfield.

Maps Sent by Teletypewriter

NEW AUTOMATIC teletype stations to produce maps filled with weather symbols for use of airplane pilots have been installed at Love Field, Dallas. The service is available every three hours daily and nightly. E. C. Butler, assistant airways traffic supervisor, Department of Commerce, airways division, with the assistance of the Weather Bureau, made the installation.

Changes Made by Airline

ANNOUNCEMENT of a change in departure time of two planes from Tulsa, Okla., to Dallas, Tex., and other points was made recently by the Bowen Airlines. The plane formerly leaving Tulsa at 3:15 o'clock now leaves at 1:50. The late afternoon plane, formerly departing at 5:05, now leaves at 4:10.

The company has inaugurated a new schedule out of Houston which makes it possible for air passengers to arrive in Kansas City at 6:45 p.m., Everett Stunz, Houston representative, announced recently. Instead of departing daily at 3:25 p. m., Bowen planes now leave Houston at 12:01 p. m.

California Airline Opens

WITH the inauguration of service by the Bear Photo Airlines, the municipal airport at Stockton, Calif., is brought within twenty-seven minutes of the San Francisco Bay Airdrome on a daily-except-Sunday schedule which calls for departures from the eastern terminal at 10:15 a. m. and from the airdrome at 3:30 p. m. Pilot Ed Campbell has reported that a steady increase in passenger traffic indicates that the schedule will be doubled in the near future.

October Air Traffic Report

SCHEDULED airlines operating in continental United States carried 38,548 passengers in October, 1932, according to reports from the thirty-one companies operating, it has been announced by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Miles flown by these scheduled airlines during the month were 3,838,717; express carried totaled 99,291 pounds, and passenger miles flown were 11,191,550.

The average length of the trips made by passengers on the airlines in continental United States during July, August and September, as reflected in reports to the Department of Commerce by the air transport operators, was 275 miles, it was announced by Colonel Young. The average for the preceding three years was 227 miles.

Reports to the Department showed that American scheduled passenger aircraft flew with approximately forty-four per cent of the available seats occupied during October, as compared with about forty per cent in October, 1931. The average for the thirteen months ended October 31, 1932, was nearly forty-two per cent.

American and British Lines Cooperate

AMERICAN AIRWAYS, INC., and Imperial Airways of Great Britain have completed arrangements for handling reservations over lines which are served by the respective firms.

Fast Air Express Line Opens

WITH AN ELAPSED time of 17 hours and 2 minutes for the eastbound flight and 17 hours and 39 minutes for the westbound trip, the Air Express Corp. opened its overnight air freight and express service between New York City and Los Angeles, Calif., December 18. The westbound plane, piloted by Clyde Pangborn, carried 771 pounds of merchandise, while the plane flying east, with Buddy Jones as pilot, transported 359 pounds.

The company is now operating on a daily eighteen-hour schedule, carrying freight and express only between the two cities. Lockheed low-wing windowless monoplanes are used, powered with single Wasp engines. Although only through merchandise is carried, refueling stops are made at Columbus, Ohio; St. Louis, Mo.; Wichita, Kans.; Albuquerque, N. M., and Seligman, Ariz. Pilots are changed at Wichita.

Officers of the new company include Phil. H. Philbin, Jr., James G. Woolley, Vance Breese and Irving Eaton.

Airplane Radio Simplified

RADIO call signals will not have to be used in the future by aircraft, according to a recent decision by the Federal Radio Commission. Licensees operating in the domestic aviation service will be allowed to use either the trip number or the aircraft number in communicating between airplanes and ground stations.

Independent Operators Organize

ORGANIZATION of the Scheduled Air Transport Operators' Association was completed at a meeting of representatives of eight systems, at Oklahoma City, Okla., recently. T. E. Braniff of Oklahoma was named president. The association, a new national organization of independent airline operators, has for its announced objects the promotion of air passenger service and the effecting of economies in carrying air mail. The movement was instigated and the conference called by Manager Paul Braniff of the Braniff Airlines.

In addition to the president, the officials elected include Temple Bowen of Fort Worth, Tex., manager of the Bowen Air Lines, vice president, and Ellis Fagin, Little Rock, Ark., of Hunter Airways, secretary-treasurer. Plans as outlined at the conference call for expanding the association to include all independent operators not now carrying air mail.

Varney Traffic Greatly Increased

TRAVEL over Varney Speed Lines' Los Angeles division has almost tripled within a year, it has been announced by President Franklin Rose. From October 15 to November 14, 1931, the first month the line was in operation, 322 passengers were transported; for the same period this year, 830 passengers were carried.

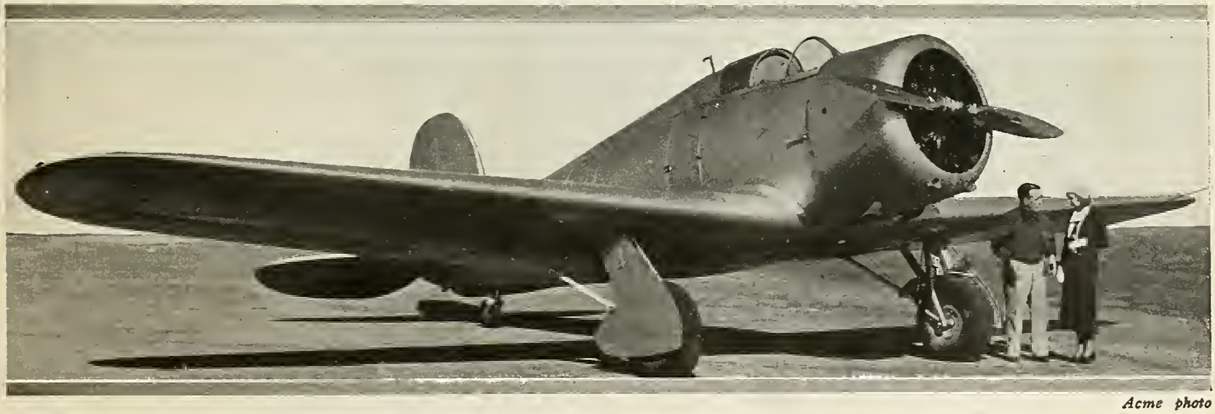
New United Planes Almost Ready

THE first of the new twin-engined ten-passenger transport planes being produced for United Air Lines by the Boeing Airplane Co. is scheduled to be completed and test flown this month, it has been announced by P. G. Johnson, president of the air transport company and the manufacturing plant. The present production schedule calls for completion of six transports next month and a larger number in March. The first will probably be used on the San Francisco-Cheyenne section of the airlines.

Calculations of Boeing engineers indicate the following performance for the transport: High speed, 175 m.p.h.; cruising speed, 155 m.p.h.; landing speed, 60 m.p.h.; take-off run, 950 feet; rate of climb, 900 feet per minute; climb in ten minutes, 7,500 feet; service ceiling, 19,000 feet. These performance statistics are based on full load conditions. Pratt & Whitney engines will be used. The plane will have a wing loading of 14¾ pounds per square foot.

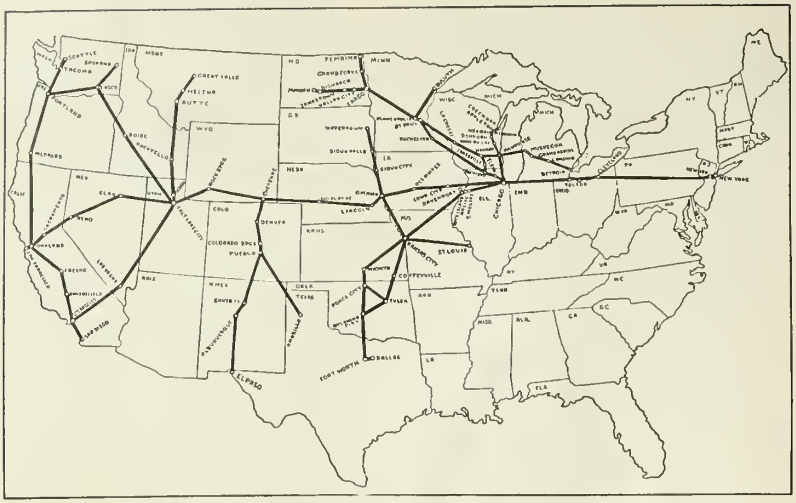
TWA Reports 100 Per Cent Record

FOR the fifth successive month the night flights of Transcontinental & Western Air from Los Angeles to Kansas City have been 100 per cent completed, and connections at Kansas City on the twenty-four-hour coast-to-coast service have been made in each case. Westbound flights and the daylight mail, passenger and express planes which also connect at Kansas City to and from eastern cities have been only slightly under that performance.



Acme photo

Wasp-powered Lockheed just before the take off from Los Angeles on first trip of eighteen-hour freight service to New York



Map showing airlines served by Railway Air Express

Railway Air Express Expands

CANADIAN Airways Limited, which operates between Pembina, N. D., and Winnipeg, Manitoba, has been added to the air express service of the Railway Express Agency. The total air mileage of the company is now 11,331 miles.

United Air Lines has reported that the recent reduction of from fifteen to thirty per cent in the rates of the service has resulted in a substantial increase in express shipments.

United Traffic Division Transfers

E. V. BUTLER has been named traffic representative for United Air Lines at Des Moines, Iowa, and Donald P. Wilson has been placed at Spokane, Wash., as traffic representative for the company.

United Mechanical Innovations

UNITED AIR LINES is installing small celluloid windshields at the bases of all antenna masts. These shields serve to keep water from collecting around the base of the mast when flying through rain, and when ice conditions exist, prevent ice formation around the base which shorts the antenna. It has been found that the insulating block around the base of the mast requires less frequent cleaning when using the windshield, as dirt and oil from the engine are prevented from collecting.

A new type clam shell fender has been completed and installed on a United Air Lines plane. This fender is one-piece design, hand-hammered aluminum which is minus the brace to axle.

Fast Fort Worth-St. Paul Service

OVERNIGHT service to Omaha and fourteen-hour service to Minneapolis and St. Paul from Fort Worth, Tex., have been announced by United Air Lines through a coordination of schedules at Kansas City with other lines. Passengers leaving Fort Worth at 9 p. m. arrive in Kansas City at 1:55 a. m. and Omaha at 4:37 a. m., leaving there at 8 a. m. to arrive in Minneapolis and St. Paul at 11 a. m. On the return flight passengers leaving the Twin Cities in the afternoon and Omaha at the dinner hour arrive in Fort Worth before breakfast.

Pacific Coast Line Chooses Official

R. S. MAYER has been appointed general traffic manager for Seattle-Vancouver Airways. A new flying schedule has been inaugurated on the line.

Airline for Western Miners Formed

THE Bennett Air Transport Co. of Boise, Ida., has reported the successful ending of negotiations for transporting freight, passengers and express to the new copper diggings at Mountain City, Nev., from Elko and Boise. The Mining Co., which is a subsidiary of the Anaconda Copper Mining Co., has completed a landing field in the vicinity of the camp.

Decoration of TWA Plane Interiors

A NEW interior-decorating scheme has been adopted for the trimotor transport planes of Transcontinental & Western Air, which gives the metal finish of the planes the appearance of an antique oak or walnut wood. The new decorating process was discovered in the search for new materials for home decoration, and the patents are owned by Lou Holland of Kansas City and Col. Paul Henderson, of Washington, both of whom have been identified with aviation for several years.

The material is designed to be applied with equal success to metal, wood, plaster or concrete and is washable without damaging effect. It is impervious to vibrations and to changes in temperature, moisture and altitude. Its quick-drying qualities cause the outer surface of the material to "crackle," thus giving the appearance of age. As it will be applied to the trimotor planes of TWA, the lower surfaces of the passenger cabin will be in brown with the crackle effect indicating that the material is antique walnut, although actually it is metal. Above the windows the color will be in the lighter shades of brown, the appearance of the passenger cabin being that of a room paneled in old woods.

Ludington Officials Chosen

ANNOUNCEMENT of the appointments of F. V. Tompkins as flight operations manager and of C. M. Belinn, as general maintenance superintendent for Ludington Airlines, Inc., was made recently by J. M. Eaton, airline president. He also announced the discontinuance of the general operations department and in its place the creation of two new departments, the flight operations and maintenance. The new officials will take over the work formerly supervised by Paul Collins, who recently resigned as vice president and general superintendent of the operations department of the company.

T-L Antennae Installed at Beacons

FORTY-FIVE of the radio range beacons on the Federal Airways System are to be equipped with T-L (transmission line) antennae, according to an announcement by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Construction work already has been undertaken at twenty-seven of the stations. The T-L antenna, which was developed jointly by the Research Division and the Airways Division of the Aeronautics Branch, was designed to eliminate night variations, which occurred at some radio beacons operating in mountainous terrain. In setting up T-L antennae, the Airways Division is endeavoring to arrange the location of each station so that one of the four courses of the beacon will cross the airport or landing field near which the beacon is located. This will be of assistance to pilots in locating landing fields when flying under conditions of poor visibility.

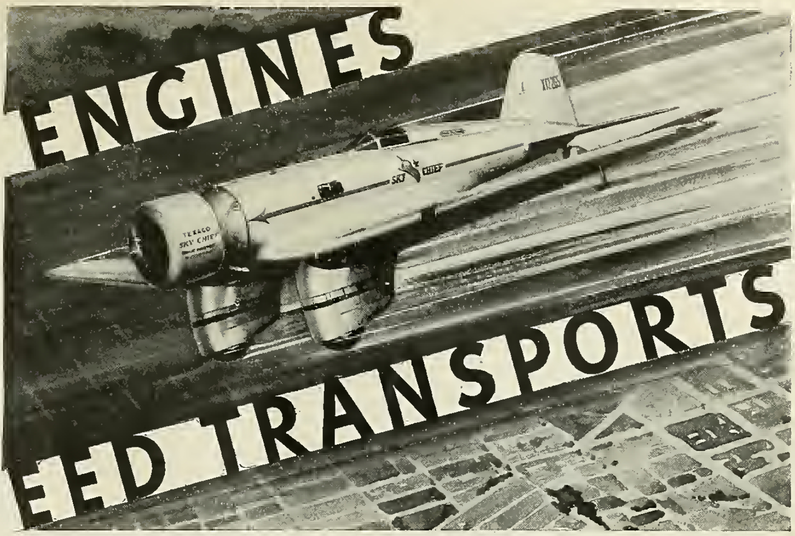
Midwest Air and Rail Lines Cooperate

AIR-RAIL service for Oklahoma City residents to Chicago and intermediate points has been made available under a consolidation of service between the Rock Island Railway and Braniff Airways, Inc. Passengers will leave Oklahoma City at 3:15 p. m. in a Braniff plane, reaching Kansas City at 5:35 p. m. At the airport they will be taken by cars to board Rock Island trains en route to Minneapolis, St. Paul, Des Moines and Chicago.

WRIGHT ENGINES

Power the Majority of the Latest

HIGH SPEED TRANSPORTS



WRIGHT ENGINES have played a leading part in the rapid development of high speed transportation. The majority of the latest transports produced in the United States during 1932, or in production for 1933, are powered by WRIGHT ENGINES.

In the foreign field, SWISSAIR, operating the fastest airline on the European Continent, cut the time in half between Zurich and Vienna with CYCLONE-powered Lockheeds. K. L. M. (ROYAL DUTCH AIR-LINES) purchased a quantity of WRIGHT CYCLONES during 1932 to power twin-engine Fokkers for their high speed service from Amsterdam, Holland to London and Paris.

AVIO LINEE, Italian Airline, selected WRIGHT WHIRLWIND 330 h. p. Engines to power Fokkers that climb to 18,000 feet in crossing the Alps. DERULUFT, operating between Moscow and Berlin, placed orders for 26 WRIGHT WHIRLWINDS to be used in transport planes of Russian manufacture. SCADTA AIRLINES purchased a quantity of CURTISS CONQUEROR 650 h. p. Engines to power Dornier Wahl Flying Boats, for their operations in South America.

Wright Powered High Speed Transports

Lockheed "Orion" Monoplane
7-Place Transport
CYCLONE 575 h. p. Engine

Northrop All-Metal Monoplane
9-Place Transport
Advanced CYCLONE Engine

Consolidated "Fleetster"
10-Place Transport
CYCLONE 575 h. p. Engine

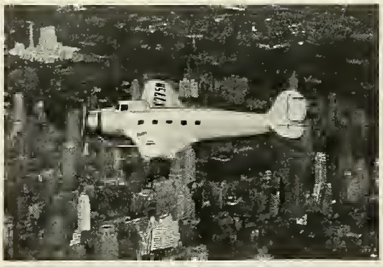
Airplane Development Corporation
Low-wing, All-Metal Monoplane
Advanced CYCLONE Engine

General Aviation Corporation
11-Place, All-Metal Monoplane
Advanced CYCLONE Engine

Douglas All-Metal Monoplane
15-Place Transport
2 Advanced CYCLONES

1933 Curtiss-Wright "Condor"
15-Passenger Transport
2 Advanced CYCLONES

1933 Curtiss-Wright "Condor"
15-Passenger Transport



General Aviation Corporation
11-Place, All-Metal Monoplane

WRIGHT

AERONAUTICAL CORPORATION
PATERSON NEW JERSEY

A DIVISION OF CURTISS-WRIGHT CORPORATION

NEWS OF THE SCHOOLS

Engineering Classes Open at Roosevelt

AN ADVANCED COURSE in aviation engineering was scheduled to open last month at Roosevelt Field under the leadership of Alan C. Morse. Mr. Morse plans to conduct classes in aerodynamics and structures, and it is expected that Leo Bauer will teach classes in materials. Preliminary instruction in mathematics and mechanics will be given if desired. Mr. Morse, a graduate of Massachusetts Institute of Technology, has had eleven years of experience, including four years in the Engineering Division of the Air Corps at Dayton, Ohio. He also has been in charge of the stress analysis and aerodynamics department of the American Airplane & Engine Corp., the General Airplanes Co. and the Fokker Co.

School Started in Idaho

MAX FENNELL of Spokane has established residence in Coeur d'Alene, Ida., and has started an aviation school on the Coeur d'Alene municipal airport. He reports that several students have signed up for instruction. He hopes to use an amphibion next summer for transportation to various northern Idaho lakes.

Advanced Night Flying Course Opened

AN ADVANCED CLASS in night flying has been organized by Cecil Pounder of the Pounder Flying Service, since floodlights and other equipment have been installed at the Pounder airport, Portland, Ore.

Fourth Boeing Scholarship Contest

FOR THE FOURTH CONSECUTIVE YEAR aeronautical scholarships totaling $7,500 in tuition value are being offered by the Boeing School of Aeronautics to students of universities and colleges throughout the United States and Canada. Four college undergraduates who submit the best essays on aeronautical subjects and who are able to meet necessary physical standards will be given flying and ground training. First prize is the complete master pilot course, covering 250 hours of flying and 924 hours of ground school, and exceeding qualifications for a transport pilot's license. Second, third and fourth place winners may select either the master mechanic course or the master pilot ground course, with the second award including twenty hours of flight instruction. The scholarship competition will close April 15. Contestants must have their essay subjects approved prior to March 15 by the National Committee of Award, of which Dean Baldwin M. Woods, head of the department of mechanical engineering of the University of California, is chairman.

Regulations of this year's scholarships have been modified to render eligible any undergraduate of good standing and in regular attendance at an accredited university or college. He must be white, between the ages of 18 and 25, of average height and normal weight, with good eyesight, devoid of any physical handicap and capable of passing the Department of Commerce transport pilot's license physical examination.

Boeing Students Modify Plane

UPON receipt of an Approved Repair Station Certificate from the Department of Commerce, the Boeing School of Aeronautics, Oakland, Calif., immediately started work on the modification of the Boeing 81, made necessary by the replacement of its Axelson 150-h. p. engine by a Wright J6-5 165-h. p. engine. Flight tests have been made, and the model, now designated 81-C, is found to have much better performance than before. All the design drawing, engineering and stress analysis were done by the school's engineering department under the direction of Wellwood E. Beall.

Oregon Institute Announces Plans

APPOINTMENT of Lieut. Wistar Rosenberg, ex-University of Oregon athlete and ex-Army officer, to the position of chief pilot of the Oregon Institute of Technology, Portland, Ore., has been announced by James B. Dinsdale, superintendent of the school, who also reported plans for the aviation division for 1933.

Lieutenant Rosenberg has had 1100 hours of flying in five years of aviation work, including twenty-two months in the Army Air Corps. He is now a lieutenant in the Air Corps Reserve, attached to the 321st Observation Squadron at Pearson Field, Vancouver, Wash.

Under Lieutenant Rosenberg's direction will come the instruction in flying, conducted in the afternoons from Swan Island airport in a Fleet training biplane, and the lectures in meteorology, navigation, theory of flight and history of aviation. Instrument flying instruction, special classes for the private flier, have been added to the course, and special night courses for private fliers will be conducted by Lieutenant Rosenberg.

School Opened at Des Moines Airport

FLOYD M. DAVIS and T. O. McMahon of Des Moines have announced the opening of the Aerial Service and Sales Co., an aviation school, at the new municipal airport. The company has been awarded open territory sales rights of Rearwin Airplanes, Inc., in Iowa and Minnesota.

In addition to the school, the company will operate a taxi service, using a Rearwin two-place cabin plane.

Company Takes Over Minneapolis Depot

THE NORTHLAND AVIATION CO. has taken over the American Airways, Inc., depot at the Wold-Chamberlain Field, Minneapolis, Minn. The properties consist of two large hangars, with complete shop equipment, school equipment and parts department.

The company operates an aviation school with private, limited commercial and transport flying courses, day and evening courses for mechanics and a master mechanics' course. In addition, it is organizing a ground school course for the younger business men of Minneapolis. J. G. Lamb, formerly general sales manager of all Universal Aviation Schools, is in charge of school enrollment activities for the Northland company.

Other activities of the company include airplane sales, complete repair service, storage, aerial photography and charter flights to any point in North America.

Instrumental in the organization of the Northland company was Paul D. Paine, for many years associated with the Universal Aviation Schools, and more recently manager of the Minneapolis branch of American Airways, Inc. In addition to Mr. Paine and Mr. Lamb, a group of Minneapolis business men, headed by C. E. Spring and Barry N. Collins, are actively identified with the new corporation.

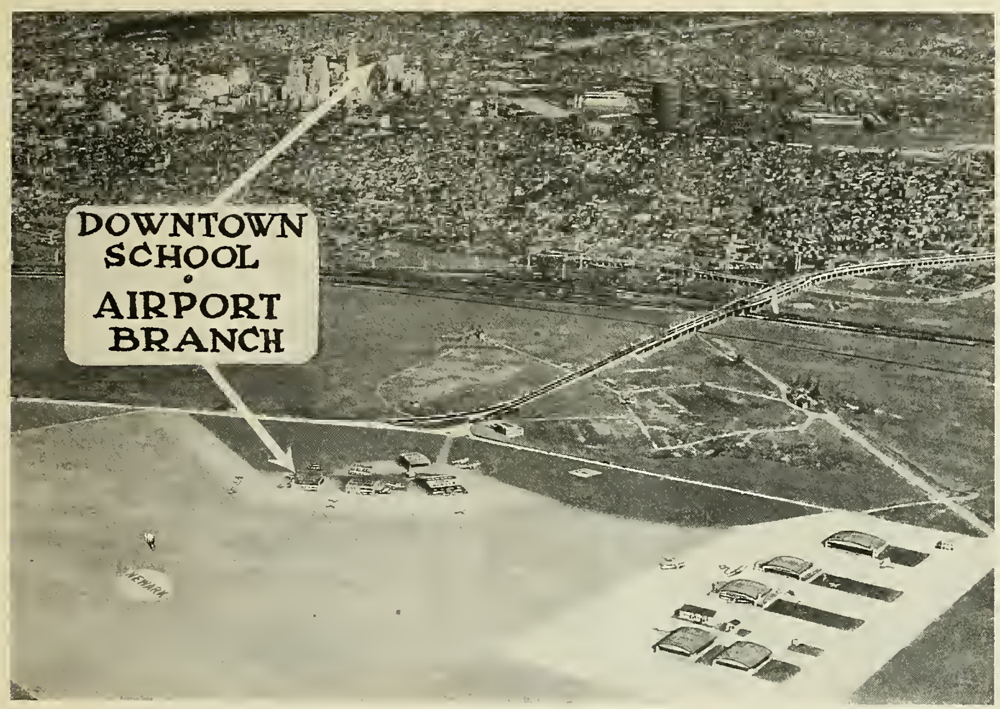
Air Training Given at Birmingham

THE Q. E. D. school of aeronautics, headed by John A. Donnalson of the 106th Observation Squadron, Alabama National Guard, has been opened at the municipal airport, Birmingham, Ala. The school recently took delivery on a new Aeronca plane.

Tulsa Students Progress

SINCE THE ESTABLISHMENT of the Aeronautical Students' Association in Tulsa, Okla., local interest in aviation has increased materially, Chief S. Milton Story of the instruction corps stated recently. The association combines the features of a flying school with those of a flying club, makes flying available for the average student at a low cost, with up-to-date equipment and planes available at all times.

In addition to the regular flying course, which includes primary training, solo work, cross-country and night flying, blind flights and a ground course are offered. An airport east of the city has been provided for the organization, with Mr. Story and W. B. Perry as instructors. Several young women have already enrolled among the flying students.



558 BROAD STREET
MItchell 2—7506

NEWARK AIRPORT
MArket 3—2346

The downtown school is located opposite the public library and museum. Situated one block north of the Newark - Manhattan Tube Station, hub of Newark's transportation systems — buses, street cars, automobile highways and tubes. The field service is conducted at Newark Airport, only seven minutes from the school.

WHY NEWARK?

"When establishing our School of Aeronautics, we felt that one of the important factors was an advantageous location. We chose Newark because it possesses the world's busiest airport—the Eastern terminus of most of the major passenger, mail and express airlines. Thus our students can observe modern methods of actual transport operations on a large scale; and establish contacts with this constantly growing branch of aviation. Furthermore, Newark is an industrial center where living conditions are reasonable. It is easily accessible to the entire New York metropolitan area. ¶ With an unusually competent staff of instructors, plenty of new equipment and a central location, we feel that we can offer the finest in aeronautical mechanical training. The men who will service and operate the nation's transport airplanes in the very near future are those who are preparing themselves now. We are confident that we can help you to make a place for yourself."

Casey Jones

BROKERAGE SERVICE

The Casey Jones School of Aeronautics, acting as aircraft and engine brokers, offers a new kind of service. Casey Jones, personally, will recommend and endeavor to secure for you the type of plane and engine best suited to your particular requirements. Owners wishing to contact ready buyers are invited to list their aircraft and engines with Mr. Jones and to write for Registration Blanks. Likewise, potential buyers are invited to avail themselves of this unique service.

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THE AIR SERVICES

Berry Takes Command at Lakehurst

COMDR. F. T. BERRY last month succeeded Capt. Harry E. Shoemaker as commander of the Naval Air Station and rigid airship training and experimental squadron at Lakehurst, N. J. Captain Shoemaker has been ordered to take command at the Naval Air Station at Sunnyvale, Calif.

B/J Naval Plane Tested

SUCCESSFUL test flights of a new type of naval plane, constructed by the B/J Aircraft Corp. of Baltimore, Md., were conducted recently at Baltimore and Anacostia, D. C.

The plane, known as the XOJ-1, is reported to have a maximum speed of 150 m.p.h. and a landing speed of 28 m.p.h. Because of the plane's exceptionally low landing speed, it is hoped that by the incorporation of its principal features in other types of service planes the present system of landing on aircraft carriers with deck-arresting gear eventually may be eliminated. Improvement in the performance of naval aircraft could then be effected in the saving of weight which would be brought about through the elimination of strength factors now incorporated in naval planes to absorb the shock of arresting gear. A flap, formed by lowering the lower surface of the trailing edges of the plane's wings, retards the speed of the plane at the will of the pilot. This is equally effective in taking off and in landing.

Planes Drop Building Materials

ARMY AIR CORPS planes dropped building materials from the air to enable the Forestry Service to build a shelter for forest rangers in the Hawaiian National Forest. The materials could not be transported in any other manner because of the inaccessibility of the location chosen for the erection of the hut.

Alabama Air Service Appropriation

THE Alabama Legislature has approved a law appropriating $142,000 for the air service of the National Guard. Of this amount $140,000 is to be reserved for expenditure in the fiscal year beginning October 1, 1934.

Blind Landing Device for Air Corps

APPARATUS simulating direction finding, blind landing and radio beacon signals, for the instruction of pilots without using ground equipment, has been put into use for the training of Army fliers. Consisting of a panel with three knobs and six switches for the instructor's cockpit and a set of earphones and small dial for the student, the device was designed by Maj. William C. Ocker and Lieut. Carl J. Crane, authorities on blind flying.

By means of the knobs and switches on the instructor's panel, the instructor is able to imitate radio navigation signals. While the student, in a hooded cockpit, hears these signals through his earphones, he at the same time may see whether he is on the proper course or in which direction he errs by means of pointers on the dial, operated from the instructor's panel.

The new device has already been installed in a training plane at the Primary Flying School, Randolph Field. With the apparatus, pilots may be trained at any Army field.

Landing Fields on California Islands

AS A RESULT of several forced landings on San Clemente Island, a recommendation was made to the Naval commandant of the district that emergency landing fields be located on San Clemente and other outlying islands of the California coast, wherever practicable. The commandant approved the idea and ordered that a preliminary survey be made. Such field sites selected will be marked and charted, but will be used solely for emergency landings.

Hensley Field to be Improved

THE A. J. Rife Construction Co. of Dallas, Tex., has been awarded the contract for improvements to cost $69,000 at Hensley Field, municipal airport under lease to the Army at Dallas. Immediate construction includes two buildings for officers' quarters and one building for noncommissioned officers. Facilities on the flying field also will be improved. Construction will be under direction of Capt. W. M. Allison from Fort Sam Houston, San Antonio.

Officers' Homes to be Built

CONTRACT for construction of fifty-five new homes for officials of the Army Tactical School at Montgomery, Ala., was awarded recently to the J. A. Jones Construction Co. of Charlotte, N. C. The cost of the new homes will be approximately $640,000. Plans called for the erection of twenty company officers' quarters and thirty-five field officers' quarters.

Texas Officers' Club Elects

LIEUT. L. E. GROSS has been chosen as president of the Houston (Tex.) Reserve Officers' Flying Club. Lieut. L. L. Bear was elected vice president. The organization is formed to secure flying equipment for tactical training and for maintaining troop schools in which courses are offered by the Air Corps schools.

Schildhauer Succeeds Rounds

LIEUT.-COMDR. EDWARD W ROUNDS has resigned as commanding officer of VN-6R, Washington, D. C., Naval Aviation Reserve unit, and has been succeeded by Lieut.-Comdr. Clarence H. Schildhauer. Commander Rounds will continue as aeronautical engineer in the Flight Test Section of the Anacostia Naval Air Station. Commander Schildhauer, who was American pilot of the Do-X, is a representative of the General Aviation Corp.

Navy Issues Air Almanac and Charts

THE Naval Observatory, with the assistance of the Hydrographic Office, has compiled an Air Almanac for 1933. Designed primarily for aviators, the book will result in considerably shortening computations involving astronomical observations. The main feature is the direct tabulation of the Greenwich Hour Angle, eliminating Greenwich Sidereal Time and Equation of Time. Interpolations of sun and moon are reduced, and the times of sunrise and sunset are found from a diagram.

An instant index chart booklet of the northeast sector of the United States is expected to be ready for official use by the Army and Navy within about two months. The book will consist of twenty-two charts showing routes, airports and general aviation information, so arranged that any chart can be instantly located from the key chart.

Other publications will include aviation charts of South American coastal areas, sectional area charts of strategic points, aviation plotting sheets and a series of airship charts covering transcontinental air routes for official use, Naval Air Pilots of the United States coastal air routes and neighboring countries, dead reckoning tables and a chart possessing features that may permit sextant observations of the sun or stars to be plotted without the usual computations and reference tables.

An Army Flying Family

THREE brothers in the Fator family of San Antonio, Tex., are now pilots in the Army Air Corps, and a fourth brother plans to enter the Corps soon. The third member of the family to graduate from Kelly Field, Lieut. J. W. Fator of the most recent graduating class, has sailed for Hawaii for duty at Luke Field, Honolulu. The youngest of the four brothers, R. B. Fator, is now in college preparing to begin training at Randolph Field next year. Lieut. L. D. Fator, instructor at Chanute Field, Ill., finished in March, 1928, and Lieut. C. D. Fator was graduated in October, 1928.

(Continued on following page)

STANDARD *of the Industry*

WHEN a product becomes the accepted standard in its field, it must possess merit beyond question.

Goodrich Low Pressure Silvertowns have won this position in the field of air transportation because they are safer—because they have *demonstrated their ability to make take-offs and landings easier . . . more dependable on every plane that has ever adopted them.*

Do you realize how little it costs to change over from high pressure to low pressure tires? Bring your plane up to standard. Goodrich Low Pressure Silvertowns can be quickly and easily installed on your plane with or without brakes —no structural changes are necessary.

See your nearest Goodrich Dealer or write to the Aeronautical Division of The B. F. Goodrich Rubber Company, Akron, Ohio, for complete details.

Goodrich *Airplane* Silvertowns

Over 40 Rubber Products for Airplanes • including Tires • Tail Wheels • Abrasion Shoes • De-Icers • Matting • Rubber Hose Grommets • Shock Absorber Cord • Head-phone Cord • A complete line of Rubber Aeronautical Accessories.

(Continued from preceding page)

World War Birds to Meet

PLANS for the second annual migration of the International World War Birds Association, in conjunction with the fifth annual All-American Air Races at Miami, Fla., January 5-7, are being made by Col. William G. Schauffler, Jr., president. The association has a membership of about 1,000, composed of pilots, gunners, observers, bombers and other fliers of the War. Every country of the Allied and Central Powers is represented in the membership.

Improvements to be Made at Pensacola

A $32,000 CONTRACT for grading and preparing taxiway and spillways at the Naval air station, Pensacola, Fla., has been awarded by the Navy Department to the Smith Engineering & Construction Co., Inc., of Jacksonville, Fla.

Helmets and Mechanics' Caps

A HELMET designed to be especially comfortable to any shape of face or neck has been developed at the Army Materiel Division, Wright Field, Ohio. This helmet has adjusting cords around the binding edges, and the chin strap has been eliminated in favor of a piece of soft leather material which is fitted over the chin with a cut-out for the point of the chin to come through. The material used in the newer type is a single thickness of lamb shearling without the conventional outer leather shell. Chin guard and straps are of leather.

The Materiel Division has announced the combination of a helmet and cap in a mechanic's cap which, when worn in ground work about the airplane, with the visor in front, offers protection to the eyes and face from the slipstream and dust and sun, and when turned around with the visor to the back and the inside flaps pulled out, forms a helmet for short flights. The cap is made of mercerized cotton cloth.

British Order American Military Plane

A TWO-SEATER Vought Corsair plane, equipped with a 550-horsepower Pratt & Whitney supercharged Wasp engine and a Hamilton Standard controllable-pitch propeller, has been built for the British Air Ministry. Generally similar to the type furnished the United States Navy about a year ago, the Corsair is capable of being flown either as a landplane or a single-float seaplane. It is understood that the British order calls for both the seaplane and landplane equipment.

The Vought Corsair has been used for a number of years in the United States Navy on light cruisers and battleships, where it is catapulted as a seaplane. Foreign seaplanes are usually of the twin-float type. It is believed that the British Air Ministry's purpose in purchasing the Corsair is to investigate the merits of the single-float type, and at the same time to acquire a representative sample of American aircraft construction. This purchase also indicates a revival of interest abroad in catapults on shipboard.

Indiana Squadron Leader Named

ADJT. GEN. PAUL E. TOMBAUGH has recommended to Governor Harry G. Leslie of Indiana the promotion of Capt. Orville H. Stout of Indianapolis to command the 113th Observation Squadron with the rank of major. He will succeed the late Maj. Richard F. Taylor.

Bennett Race Winner Returns

LIEUT.-COMMANDER T. G. W. SETTLE, U. S. N., pilot of the winning balloon in the Gordon Bennett International Balloon Race in September, has returned to the United States and is stationed at Akron, Ohio, on duty inspecting the *U.S.S. Macon* at the Goodyear-Zeppelin Co. plant. Lieut.-Commander Settle flew from Europe to South America on board the *Graf Zeppelin* as the guest of Dr. Hugo Eckener, commanding officer of the airship. Acting under Naval orders, he also made observations of the operations of the engines of the zeppelin.

Naval Station Salvages Oil

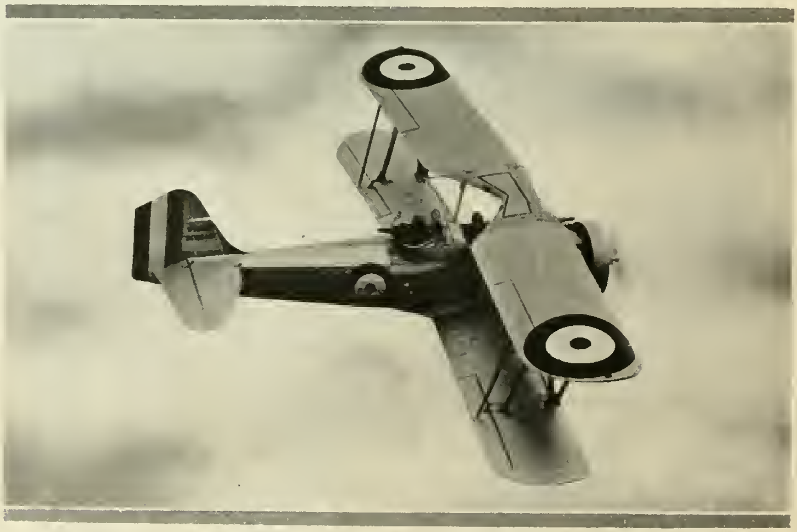
DURING one month last fall 3,500 gallons of used aviation lubricating oil were reclaimed at the San Diego (Calif.) Naval Air Station and turned into store for issue. The reclamation, which was done through the cooperation of the Engineering Experimental Station at Annapolis, Md., was performed at a cost of 2.85 cents per gallon plus labor, which was done by enlisted personnel. Two men can operate the reclaiming plant.

Chief Wagner, foreman of the ignition shop at the station, has devised a simple spark-plug testing outfit which reduces the time required for the complete standard test of the spark plugs to three seconds. The testing outfit formerly in use was designed to test twelve plugs at one time, at a maximum output of twelve plugs in six minutes. The new outfit tests one plug at a time at the rate of twenty plugs per minute under ordinary conditions.

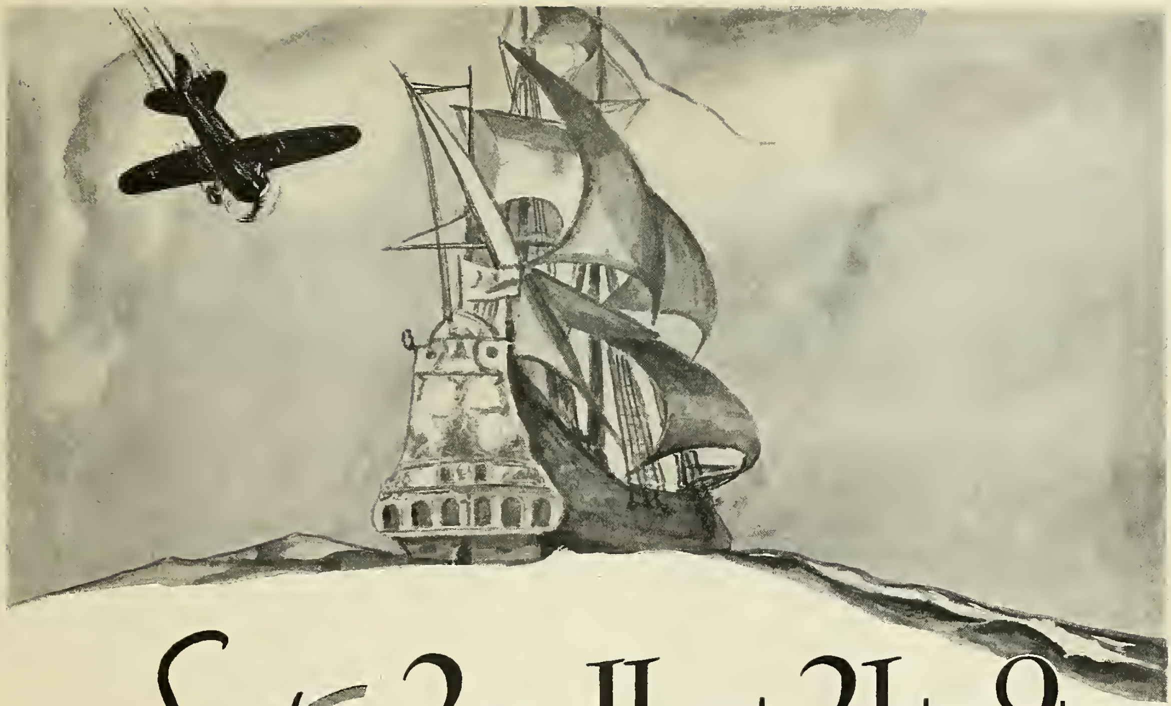
Wheeler Field to Have Historic Plane

ORDERS have been received by the Army Air Corps, Hawaiian Department, directing that the Army Fokker *Bird of Paradise,* the first airplane to make a successful flight from the United States to Hawaii, be placed near the main entrance to Wheeler Field as a monument of that historic event. The plane has been at Luke Field in a dismantled condition, but it is proposed to restore it to approximately its condition at the time of the flight to Hawaii. It will be placed in a small pavilion, which will be built near the entrance to the field where it landed after a flight from Oakland, Calif., in 1927. The building will be so constructed as to permit an unobstructed view of the plane from all angles.

The Fokker, a trimotor monoplane, was flown from Oakland to Wheeler Field in June, 1927, by Lieuts. Lester J. Maitland and Albert F. Hegenberger. The extra fuel tanks were later removed, and the plane was used for three years to transport personnel and freight among the Islands. It was planned to have the Territory of Hawaii acquire the Fokker and place it on exhibition in Honolulu, but the necessity for economy led the 1931 Legislature to deny an appropriation for a building to house the plane.

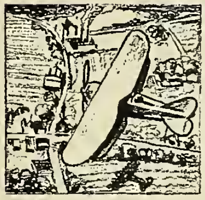


Vought Corsair plane recently delivered to the British Air Ministry



Smashing 2 years 11 months 21 days 9 hours IN THE Globe Circling

OF **FERDINAND MAGELLAN** *nearly 3 years*
POST & GATTY *8 days 15 hours 51 minutes*



DEAD STICK »»
What would you do?

If you would like to know the answer and gain some conception of the thoroughness of Spartan Training . . . write us for this solution of one of many flying hazards you might encounter any time.

Spartan Students are taught to know what to do **EVERY TIME!**

When Magellan circled the globe in the sixteenth century it took him almost three years—Post and Gatty did the same trick in eight days 15 hours and 51 minutes . . . smashing records—certainly! But possible only because they knew WHAT *to do in the emergency.*

If YOU want to take your place among the leaders in aviation, you must have the type of training that will fit you for the job. Spartan students ARE getting this training today, *that will place them tomorrow among the* GREAT *in Aviation.*

Spartan Students KNOW what to do regardless of conditions, because they have been taught to look upon the emergency—not as a possibility but as a certainty! If you will make the most of aviation tomorrow we urge you to write for the story of Spartan; it may mean the greatest forward step you will ever take.

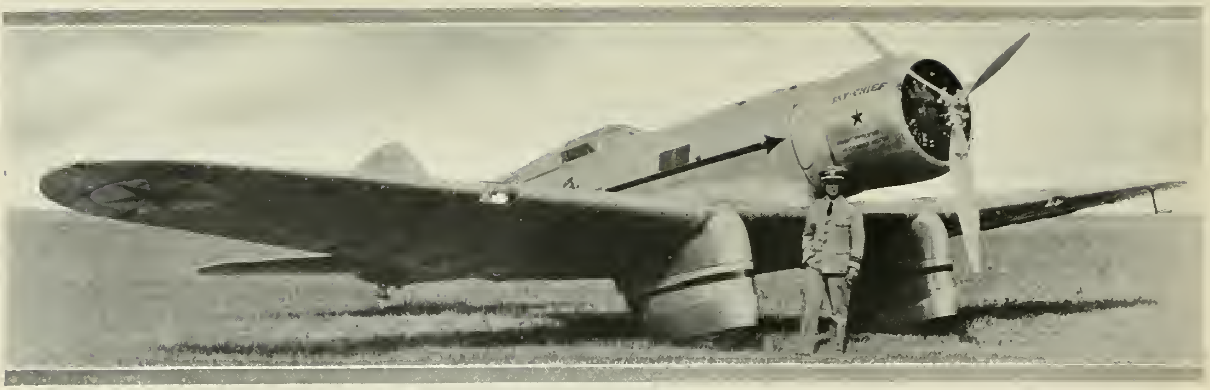
SPARTAN

Students *Tomorrow Aviation's Brightest* STARS

SCHOOL OF AERONAUTICS

P. O. BOX 2649 MUNICIPAL AIRPORT, TULSA, OKLAHOMA

AFFILIATED WITH THE OKLAHOMA MILITARY ACADEMY
WILL ROGERS AIRPORT, CLAREMORE, OKLAHOMA



FRANK HAWKS' NORTHROP *GAMMA*

FOR more than two years, while Frank Hawks was flying about the United States and Europe establishing many intercity speed records in his Texaco 13, he had in mind the application to transport operations of the speeds attainable in this racing plane. His first idea was to continue the experimentation and adapt the speeds to mail and express type planes because his theory was that, first, the mails and express should be carried rapidly, and after a period of experience had been gained with that type of ship, it would be obvious that designers could make the speeds applicable to the carrying of passengers.

At that time he consulted with John K. Northrop regarding the design of a high-speed long-range plane for a particular flight which he had planned, and was in constant communication with the Northrop factory on the subject.

Finally in February, 1932, the Texas Company approved an appropriation for the building of the ship which Frank Hawks considered ideal. He gave to eligible aircraft manufacturers a set of specifications for the ship. His specifications, which were written by him on the back of an envelope, were as follows:

"Super mail express. Radial or line, if possible (meaning in-line engine). Fuel for two thousand miles. Cruising speed at 85% of power, 220 miles per hour minimum. Landing speed with one hour fuel, using dump valves, 70 miles an hour or less, maximum. Designers' choice on engine. Single seater. Ceiling 15 to 20 thousand feet."

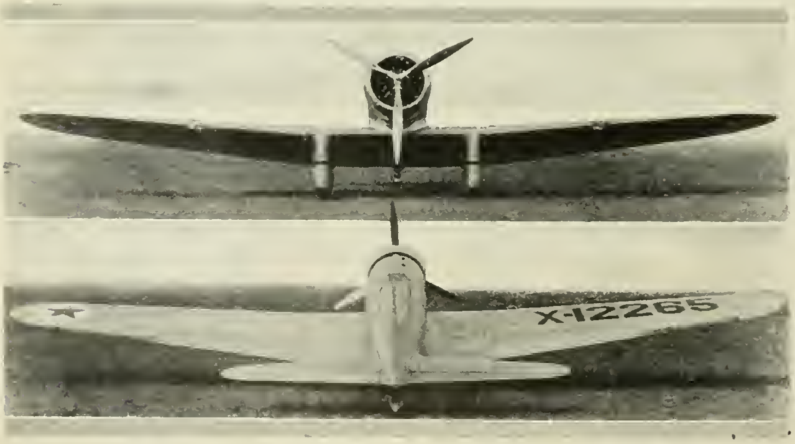
Several months' consideration was given these specifications and finally in March, last year, plans were completed which met with the approval of Commander Hawks and won the unofficial competition which he had been conducting. Actual design work was begun in May and the ship was first flown on December third.

In general, the new Northrop "Gamma" transport (named "Texaco *Sky Chief*") follows previous Northrop developments in that wings, fuselage and tail surfaces are of all-metal stressed skin or monocoque construction. Important improvements, both structural and aerodynamic, have been made, however, with the result that the strength-weight ratios and performance of this new ship exceed anything previously achieved in a transport type plane.

Weighing approximately 3300 pounds empty, the Hawks ship carries a gross load of more than 7100 pounds, or a disposable load of more than 115 per cent of its own weight. This is in no sense an overload, for mail planes of the same type will carry an ATC based on this gross weight. Practically all previous long-range ships have had to carry 50 to 100 per cent more weight than their normal disposable load and so have been heavily overloaded at the start of any long flight. Commander Hawks' plane, however, carries enough fuel for 2500 miles range at over 200 miles an hour as a normal load and will actually carry considerable weight in addition to this fuel supply when necessary.

After considerable research in the ten-foot 200-mile-per-hour wind tunnel at the California Institute of Technology, a new type of low-wing fuselage fillet has been developed which eliminates the unfavorable characteristics of almost all previous low-wing planes. The phenomenon known as "buffeting" has been eliminated and there is no adverse fuselage-wing interference. The wing-fuselage combination has a higher lift than the wing alone, and less drag than the sum of wing and fuselage drags. It has also been possible to lower the wing with relation to the fuselage, providing a simpler structure and more cargo space, and the large volume of the fillets is added to the cargo space by incorporating them in the fuselage shell itself.

A further refinement of the full cantilever pants type landing gear pioneered

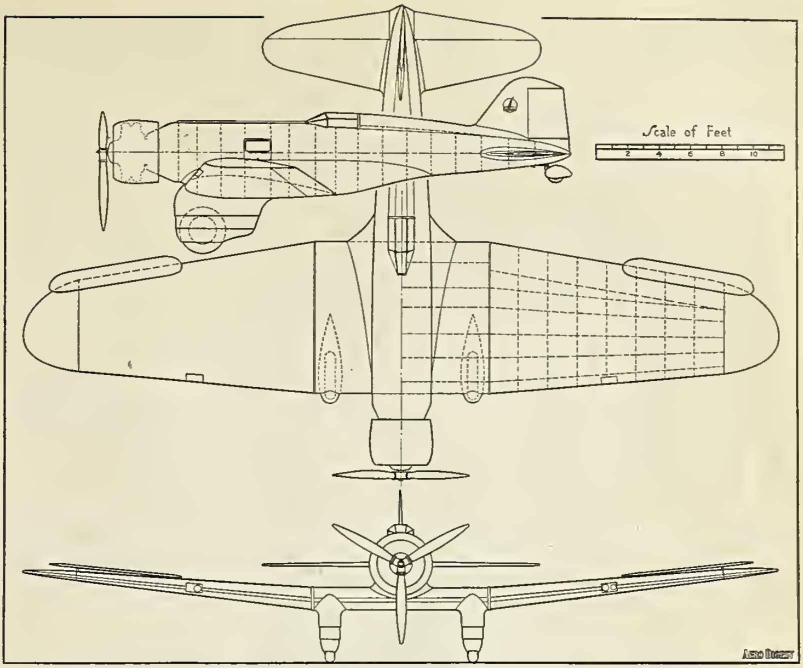


Front and rear views of the Northrop "Gamma" high speed transport in this country by Northrop has been used. This gear has about one-sixth the drag of a normal external tripod landing gear, yet involves none of the weight and structural complication usually attendant to the retractable type. A further advantage of the cantilever gear is the fact that the center section is completely unobstructed, and left available for the incorporation of fuel tanks, or armament as desired. The wheel tread is nine feet. Goodrich tires and tubes and Cleveland Pneumatic Tool Company's shock absorber struts are used.

The ship has a normal fuel capacity of 366 gallons in the wings and an additional 250 gallons is carried in dumpable tanks located in the fuselage between the fire wall and pilot's cockpit, giving a total normal capacity of 616 gallons which will be used for the long-range high altitude research program contemplated. The tanks are provided with Protectoseal filler units.

The engine is a new Wright Whirlwind R-1510 fourteen-cylinder two-row radial developing nearly 700 h.p. at sea level and eventually to be supercharged to deliver 600 h.p. at 12,000 feet. The equivalent flat plate area of the plane, including profile drag, is less than six square feet, which is surprisingly low for a plane of 363 square feet area and 7100 pounds gross weight. The extremely low drag and high power at altitude make possible performance in a practical transport airplane which has formerly only been obtainable by the use of special racing airplanes.

As planes of cleaner design are developed, the problem of landing over obstacles into small fields becomes more and more difficult of solution. In fact, this disadvantage has often necessitated the choice of slower and less efficient planes when operations were planned over difficult terrain or from small fields. A satisfactory solution to this problem has been accomplished in this new Northrop product. A trailing edge flap of about 20 per cent chord length is hinged to the lower surface of the outer wing panels. Instead of depressing the whole trailing edge, only the bottom surface is dropped, the result being to increase the drag of the whole plane from 300 to 400 per cent at the same time that the effective lift is increased about 35 per cent. The lift increase results in a correspondingly reduced stalling speed, but an even more important function of the flaps enables the pilot to glide in over obstacles at a very steep angle, with the nose well down, without excessive speed, and without tendency to "float" on landing. Use of the flaps enables the pilot to select his gliding angle at any point desired within the range from fifteen- to five-to-one, without stalling, slipping, or any unnatural maneuvers. When desired, the partial depression of the flaps reduces the length of takeoff run about 20 per cent.



Scale outline drawings of Hawks' Northrop "low-wing" transport

Good lateral control with the flaps either retracted or extended is made possible by separating the ailerons from the wing and mounting them above the trailing edge. In this position lateral control is actually improved when the flaps are depressed, due to the resultant higher relative airspeed over the upper surface of the wing.

Structural improvements include the use of new high strength aluminum and magnesium alloys, and a more efficient design of the cover sheet stiffening systems. It has been possible to increase strength-weight ratios by more than 25 per cent with the result that a maximum wing thickness of only 15 per cent is used, compared to the 18 to 21 per cent formerly considered necessary in ships using heavily-loaded full cantilever wings.

The specially designed Pioneer instrument board includes all the usual instruments in addition to ice-warning indicator and supercharger pressure gauge. A Sperry Horizon and directional gyro are located in the center of the board and tachometer, airspeed indicator, rate-of-climb indicator and altimeter are grouped beneath the Horizon and gyro in such a fashion that a climb is registered by an upward movement of all indicating hands and a dive by the reverse movement. A Type 747 Pioneer aperiodic compass is mounted on the floor at the pilot's right beside a new type of drift indicator.

The ship incorporates the first commercial installation of the DeBesson automatic pilot which in earlier tests has proved its ability to fly a plane on a given course for an indefinite period without attention from the pilot. The automatic pilot installation is extremely compact, requiring less than a cubic foot of space and only 25 pounds in weight.

A specially-designed Western Wireless two-way voice radio with retractable trailing antenna is mounted within reach of the pilot where servicing is easily accomplished. The radio units are light, the whole installation weighing less than 50 pounds, including transmitter, receiver and dynamotor. Power is supplied by an Eclipse engine-driven generator and Exide battery.

The *Sky Chief* is a single-place ship, most of the fuselage space being used by a roomy baggage compartment and fuel tanks. Emergency transportation can be provided for one passenger and by removing one of the fuselage fuel tanks, comfortable space can be provided for two additional passengers.

The plane is equipped with Elgin electrically-ignited flares for emergency landings and special S. & M. landing and warning lights are inserted into the leading edge in such a fashion that they do not add to the drag of the airplane.

Specifications

Wing span	48 feet
Length over all	30 feet
Weight empty (less special equip.)	3300 lbs.
Disposable load	3800 pounds
Gross weight	7100 pounds
Wing area	363 square feet
Power at 12,000 feet	600 horsepower
Cruising speed (2500-m. range)	200 m.p.h.
Landing speed (one hour's fuel)	42 m.p.h.

WRIGHT TWO-ROW RADIAL ENGINE

THROUGH the courtesy of the Bureau of Aeronautics, Navy Department, AERO DIGEST is privileged to present here the first description of the Wright R-1510, fourteen-cylinder, two-row radial air-cooled engine which powers the Texaco *Sky Chief*, new high-speed ship designed and built for Lieutenant Commander Frank M. Hawks by The Northrop Corporation.

The Wright R-1510 was developed by the Wright company in accordance with general specifications laid down by the Bureau of Aeronautics. The selection of this engine to power the new Northrop speed ship constructed for Hawks marks the first installation of a fourteen-cylinder, two-row radial air-cooled engine in an American commercial airplane.

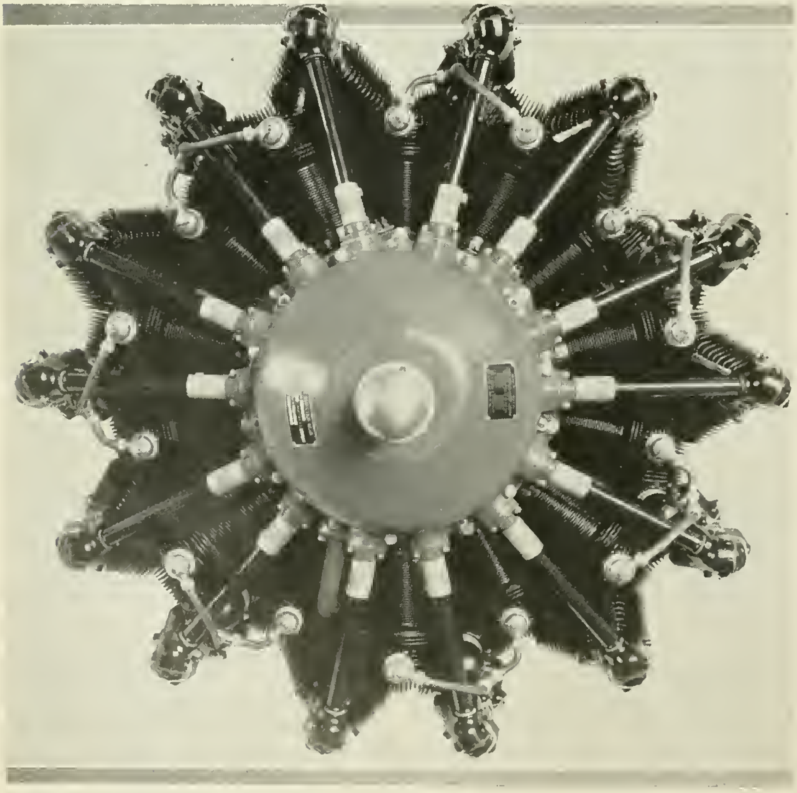
All previous models of this type which have been produced have been limited to installation in experimental aircraft for the U. S. Navy, which is fostering the development of the two-row radial engine in an effort further to increase the performance of Naval aircraft.

The most interesting characteristic of the R-1510 is the staggered arrangement of its fourteen cylinders in two banks of seven cylinders each.

It is interesting to compare the characteristics of the R-1510 with the seven-cylinder Whirlwind model rated at 230 horsepower which has the same bore and stroke. Although the R-1510 has twice the cubic inch displacement and develops more than twice the power of the seven-cylinder single-row Whirlwind, the overall diameter of both the engines is 45 inches.

The R-1510 engine as originally installed in the *Sky Chief* is a ground-boosted geared model capable of operation at full throttle at sea level to deliver a normal power output of 700 horsepower at 2300 revolutions per minute.

Aside from the special structural features incumbent on the two-row design (such as in the crankshaft and connecting rod assembly, valve operating mechanism, and the main crankcase) the major components of the R-1510 bear a marked resemblance to similar parts used with the single-row Whirlwind and Cyclone models in current production. This similarity is particularly manifest in the design of the cylinder heads, the pistons and the supercharger and rear sections of the engine which have been patterned after the Wright Cyclone R-1820-F engine recently rated at 700 horsepower at 1900 r.p.m. by the Dept. of Commerce.



Front view of the fourteen-cylinder Wright R-1510 engine

Although smaller throughout and modified to permit the feeding of adjacent front and rear cylinders through one induction pipe from the diffuser chamber, the cylinders have the same finning arrangement as those for the advanced Cyclone model. They are built up in accordance with standard Wright practice of steel barrels screwed and shrunk into aluminum alloy heads. The disposition of the head fins is such as to provide an unobstructed flow of cooling air over all portions of the head, particularly around the exhaust rocker box and port located at the rear. The fins are extended both to the front and rear of the cylinder head to form integral spark plug coolers which, when fitted with special caps attached to the ends of the ignition wires, not only provide efficient cooling at these points but protect the spark plugs and furnish the necessary radio shielding. The effectiveness of the fin design is augmented by the use of inter-cylinder and inter-rocker box baffles, both of which are of distinctive Wright design. These baffles deflect the air to the rear of the cylinder heads and barrels, insuring equally efficient cooling at all points.

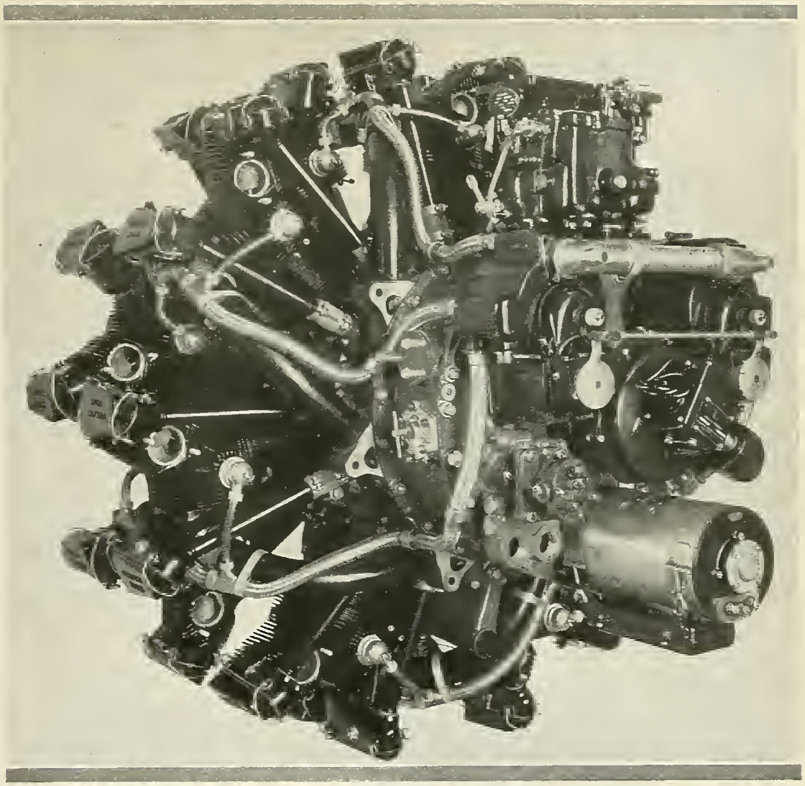
Pistons are of the high-compression type machined from forgings of aluminum alloy. Like those used with the advanced Cyclone they are relieved at the piston pin bosses for lightness and ribbed on the under side of the head to increase strength and aid cooling. Four rings are used; two compression and one oil scraper ring above the piston pin boss and one oil scraper ring near the bottom of the skirt. The compression ratio is 6.25 to 1.

Piston pins are of heat-treated alloy steel of the full floating type. Split retainer rings of spring steel fitted into grooves in the piston bosses at the ends of the wrist pins prevent scuffing of the cylinder walls.

The crankcase is composed of seven sections of heat-treated light metal alloys.

The main crankcase is built in three sections of heat-treated aluminum alloy forgings. The center section contains half of the cylinder pads for the front and rear rows of cylinders while the front and rear sections are identical and complete the assembly. The three sections are held together by bolts between the cylinders, forming a rugged construction with bearing supports integral with the cylinder pads.

The front supercharger or mounting section and the blower or rear supercharger section are almost identical with similar parts of the advanced Cyclone. The latter section is completely inter-



Three-quarter rear view of the Wright R-1510 two-row radial engine

changeable with that of the Cyclone upon slight modification of the accessory drive gear train.

The mounting section is an aluminum alloy casting attached to the rear of the main case. This section carries the valve tappet guides for the rear row of cylinders and the mounting lugs, and forms the front wall of the diffuser or distribution chamber. The fuel charge is fed to the cylinders through seven tangential outlets provided in this section from vanes cast integral with the diffuser. These vanes direct the vaporized fuel to the outlets, increasing the efficiency of the supercharger and equalizing distribution.

The blower or rear supercharger section attaches to the rear of the mounting section and carries the supercharger impeller or blower. As in the advanced Cyclone, the blower is eleven inches in diameter and operates at a comparatively slow speed, reducing the stresses on the supercharger drive bearings and increasing the reliability and efficiency of the supercharger unit as a whole.

A down-draft carbureter (similar to the type introduced on a production radial air-cooled engine for the first time with the advanced Cyclone) is located at the top of the rear supercharger section. It communicates with the inlet side of the blower through an annulus. The location of this unit insures a supply of clean air to the carbureter and eliminates the complication and additional weight of long air intake pipes from the top of the cowling to the carbureter used on certain military installations with other types of aircraft engines to prevent dust, salt spray or other foreign matter from getting into the engine. It also improves accelerating and starting characteristics and is equipped with a back suction type metering control to provide satisfactory mixture strength at altitudes.

The accessories and their drive gears are carried on a flat plate which attaches to the rear supercharger section and forms the rear cover of the crankcase. When the cover is in place, the gears and drives are enclosed within the rear half of the rear supercharger section which is separated from the blower and diffuser plate by a wall. Mounted on the cover are two Scintilla fourteen-cylinder type magnetos, oil pumps and fuel pumps, Cuno oil strainer and oil pressure relief valve. A standard mounting flange for the attachment of a suitable starter is also provided as are drives for two machine gun synchronizers, two tachometers and a generator.

All principal drives are effected through a compact and simplified arrangement of spur gears. The supercharger and all of the accessories are driven from a gear bolted to a special extension shaft from the crankshaft. This shaft has an integral starter dog permitting the application of starting torque without intermediate gearing and incorporates a spring drive which dampens out cyclic shocks and prevents damage to the gear train when starting torque is applied. Further protection is afforded to the supercharger gears from the high inertia forces caused by rapid decelerations and accelerations of the engine by a centrifugal band type clutch incorporated in the supercharger drive gear. This clutch requires no manual adjustment.

The crankshaft is constructed of one forged piece with two throws set eighteen degrees apart and supported on one ball bearing and three roller bearings. The counterweights impart virtually perfect balance to the shaft. The rear counterweight is forged integral near the crankshaft rear bearing while the front counterweight (located in the nose section behind the ball thrust bearing) is detachable.

The connecting rod assemblies consist of two master rods to each of which are attached six link rods. The master rods are of the two-piece banjo type and are free from many of the difficulties inherent in the conventional split big-end bolted type, as well as being considerably lighter. Split master rod cores, carrying steel-backed, lead bronze bearings, are fitted in the split ring which forms the crankpin end of the rod and secured by a clamping bolt. The link rods are forked at the knuckle pin end and attached to the master rod by pressed-in pins which ride in bronze bushings in the master rod core. Bronze bushings are also provided for attachment to the piston pins.

A double oil pump assembly (consisting of one scavenging and one pressure pump) is mounted on the accessory section. Oil for the main bearings is introduced into the rear end of the crankshaft under pressure. Excess oil from all parts of the engine drains to a sump attached to the nose and mounting sections and is returned to the main tank by the scavenging pump after passing through a strainer.

The propeller hub is of the No. S.A.E. spline size for both the direct drive and geared engines.

The center of gravity is located 1.0625 inches forward of center line of rear bank of cylinders.

Brief specifications for the Wright R-1510 geared engine as installed in Lieutenant Commander Hawks' plane are as follows:

Bore	5 inches
Stroke	5.5 inches
Displacement	1510 cubic inches
Compression ratio	6.25:1
Normal power	700 H.P. at 2300 R.P.M.
Reduction gear ratio	8:5
Dry weight	870 pounds
Weight per H.P.	1.24 pounds
Overall diameter	45 inches

Digest of Technical Articles from Foreign Publications

By Elsa Gardner

FRENCH AIRPLANES

L'Aeronautique. Vol. 14, No. 163, December, 1932, pp. 370-426, many figures.

THIS issue is devoted to technical details and illustrations of French airplanes and seaplanes presented at the Paris Aircraft Exhibit. Fifty-three aircraft are covered, including seven training planes, sixteen sport planes, five transport planes, seventeen military planes, seven naval seaplanes and the Zodiac E.9 airship. Among the most interesting is the Nieuport-Delage SGA941 tailless airplane. A discussion of the trend in aeronautic development for the year is also included. The advertisement section of this issue contains specifications and details of a number of French and foreign aircraft, engines, etc.

A summary of the more important types of aircraft which the British aircraft industry has to offer is given in *Flight* for November 17, 1932 (Vol. 24, No. 47, pp. 1067-1083), while the November 24 issue of the magazine (pp. 1113-1132) is devoted to details of British engines and other aeronautical equipment exhibited at the Paris show.

GERMAN AIRCRAFT EXHIBIT

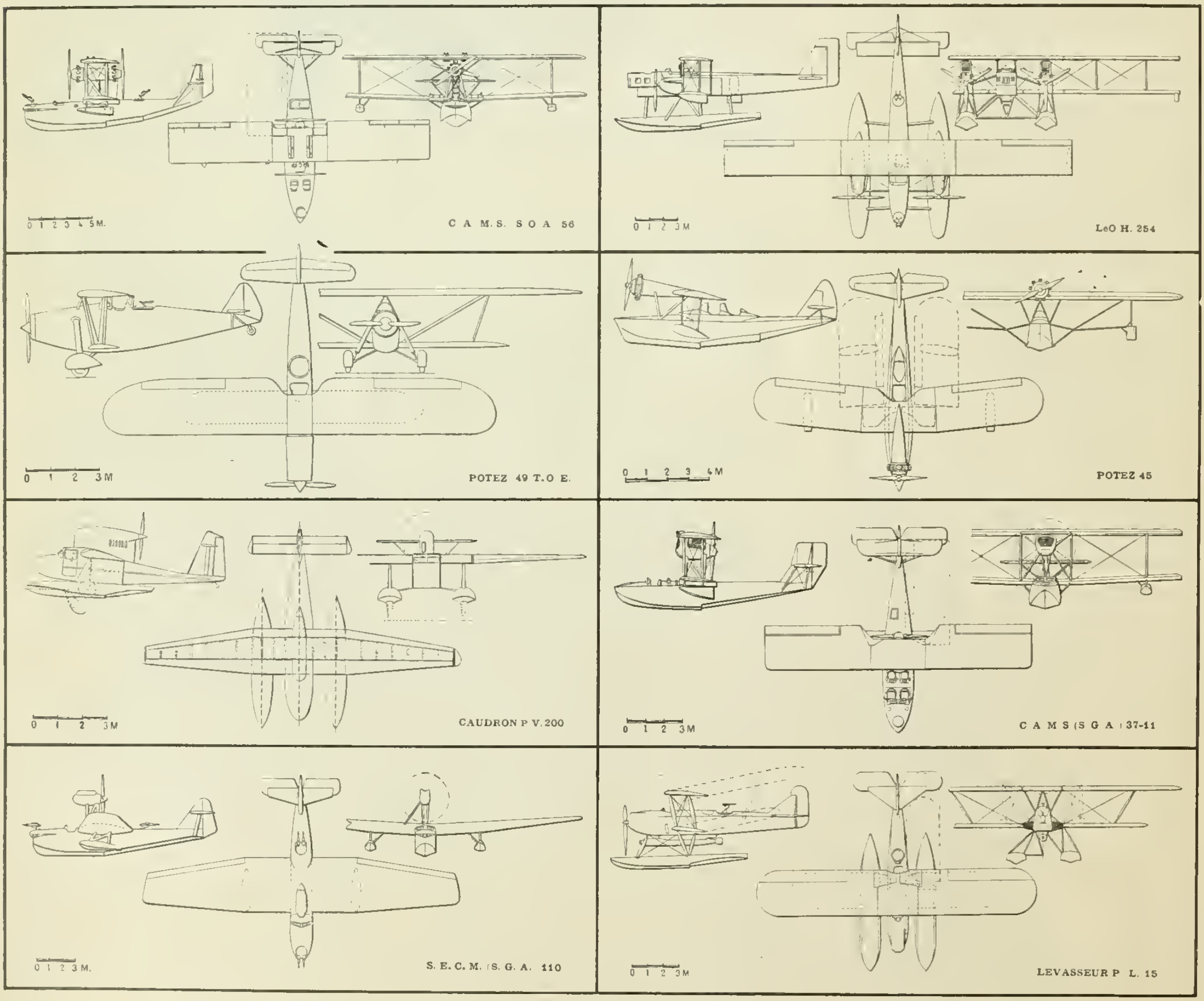
The German Aircraft Show, W. R. Schulz. Aircraft Engineering, Vol. 4, No. 45, November, 1932, pp. 273-276, 19 figs.

AIRCRAFT and engines exhibited at the Deutsche Luftsport Ausstellung in Berlin during October are described with notes on the trends in German sport planes design. The author points out that the tendency towards increasingly higher power for airplanes appears to have slackened, a return to lower power being evident. All constructors, with one exception, showed a preference for the monoplane, and in the standard two-seater the low-wing type predominated. Out of the eleven different engine types exhibited, only three were radials.

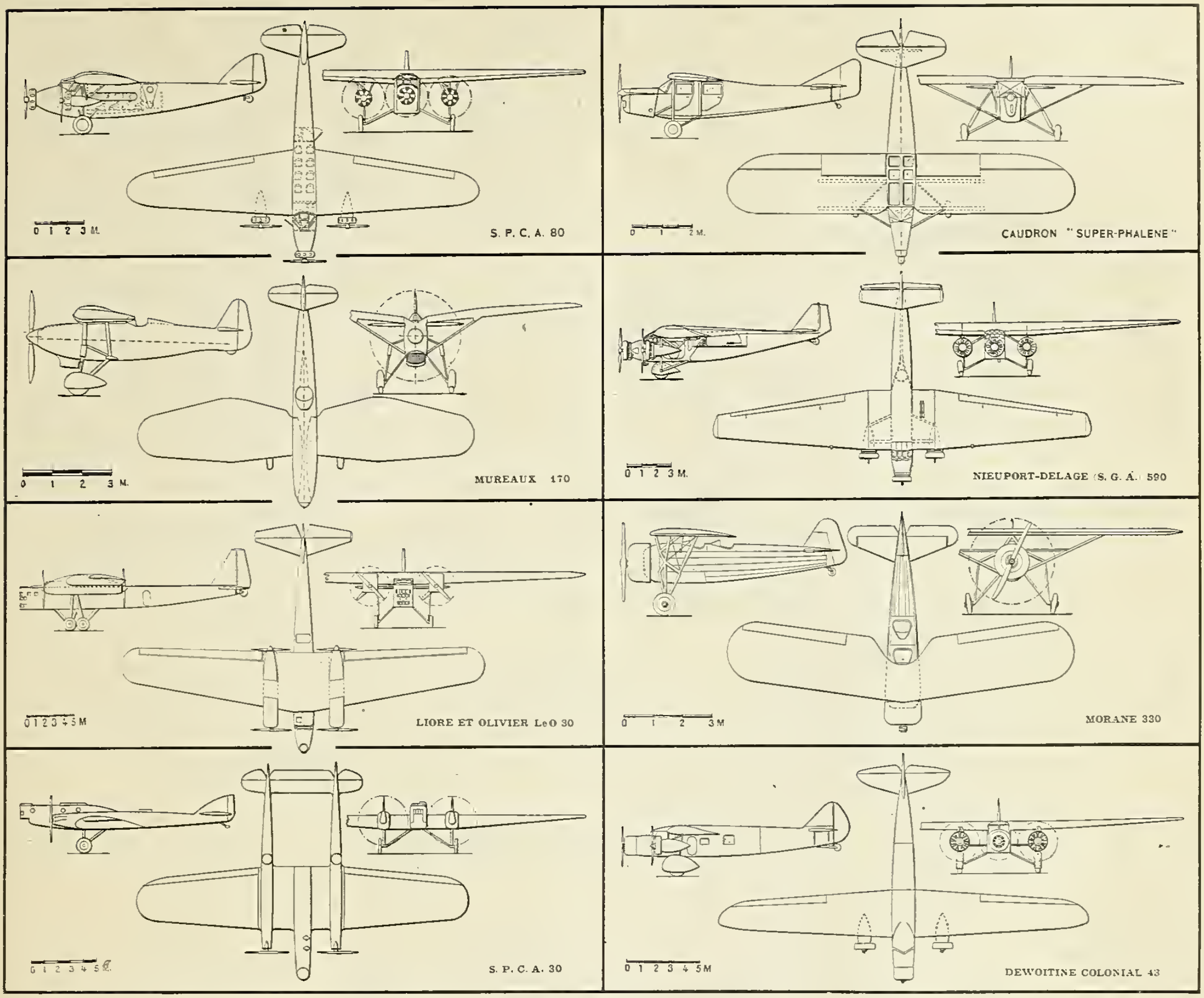
TURBULENT FLUID FLOW

The Distribution of Turbulence over the Central Region of a Pipe, A. Fage, and H. C. H. Townsend. (British) Aeronautical Research Committee. Reports and Memoranda No. 1474, June, 1932, 6 pp., 9 figs.

RESULTS of a further examination with an ultra-microscope of turbulent flow in a pipe are given, measurements being made at a much higher Reynolds number than in the earlier experiments. The new evidence supports the earlier conclusions that the maximum values of the three components of the disturbed velocity at a point on the axis have about the same magnitude. It is also shown that the region at the center of a pipe over which the maximum



Several of the new flying boats, twin float seaplanes and amphibions seen at the Paris Aero Show



Typical military and commercial land planes at the Paris Aero Show which closed December fourth

values of the cross components of the disturbed velocity are approximately equal is extended with an increase in Reynolds number.

ENGINE LUBRICANTS

A Method for the Evaluation of Lubricants (Méthode d'appréciation des lubrifiants), J. Damian. Publications Scientifiques et Techniques du Ministère de L'Air, Service Des Recherches De L'Aéronautique, No. 14, 1932, 28 pp., 3 figs.

EVOLUTION of a lubricant under the action of heat and oxygen from the air during the operation of an engine is traced from the results of tests, and experiments made in a laboratory during 120 hours at 140 degrees, which showed the tendency of a lubricant to form deposits in the lubrication system are discussed. It was found that with tests of eight types of mineral oils with the same engine, the oils which gave satisfaction furnished less than 0.2 per cent deposits after aging 120 hours at 140 degrees in copper. The relative increase in the Conradson index for aged or used oils was not greater than 200 per cent in proportion to the index of the new oils. The author concludes that a small increase in the Conradson index in aging tests does not appear to constitute a criterion in favor of the use of an oil but should only confirm the results of tests of separation of the deposits in which the proportion is not greater than 0.2 per cent in the case of oils for aviation engines.

PILOT TRAINING

Training of Pilots and Instructors, J. E. A. Baldwin. Royal Aeronautical Society Journal, Vol. 36, No. 263, November, 1932, pp. 945-954, and (discussion) pp. 954-962.

METHODS by which a pilot is taught to become a flying instructor are discussed. After reviewing the methods employed in the pre-Gosport times, the Gosport or Smith-Barry method and present-day systems, the author takes up the selection of instructors and the instructors' courses at the Central Flying School and describes the present system of instruction in instrument flying. He describes the ideal training aircraft as one which reproduces to a marked degree all the characteristics of the modern high-powered service type, rendering any intermediate training type unnecessary, and concludes with an outline of what he considers the essential assets of training aircraft.

AIRPLANE CATAPULTS

Catapults and Catapulting of Aeroplanes, P. Salmon. Royal Aeronautical Society Journal, Vol. 36, No. 261, September, 1932, pp. 704-726 and (discussion) pp. 726-732, 13 figs.

IMPORTANT conditions to be observed in the design of airplane catapults are discussed, and the design of a launching car introduced and developed at the Royal Aircraft Establishment is illustrated and explained. The author traces the development of the catapult by the United States Navy and describes the Carey type built in England, which followed the lines of the American designs. Catapults developed by MacTaggart Scott and Company also are referred to. The author concludes with details of the airplane field catapult or accelerator which was designed to enable airplanes not exceeding 18,000 pounds all-up weight to attain a speed of 60 miles per hour in a run of 120 feet, the acceleration being 1 g. This catapult consists of a revolving drum which winds in a cable to which is attached the airplane set up at a small angle of incidence.

CHROMIUM PLATED ALUMINUM ALLOY

Protection of Aluminum Alloys with Electrolytic Chromium (Protezione delle leghe di alluminio con cromo elettrolitico), G. Gallo and D. Corbi. L'Aerotecnica, Vol. 12, No. 9, September, 1932, pp. 1145-1175, 18 figs., 11 tables.

VARIOUS methods of producing a film on the surface of aluminum alloys to protect it against corrosion are described, including varnishing, anodic treatment and electrolytic deposits. The contribution of the authors to the solution of this problem consists of increasing the resistance of aluminum alloys and especially dural against sea-water corrosion by coating them electrolytically with chromium in a continuous layer. The authors point out that chromium has been used in preference to other metals because of its resistance against chemical agents, its hardness and the position of chromium in the electrochemical series of the elements. They describe a series of experiments with chromium plating which they carried out at the Institute of Applied Chemistry at Pisa College of Engineering and set forth the conditions to be observed in chromium plating aluminum.

MODEL DESIGN

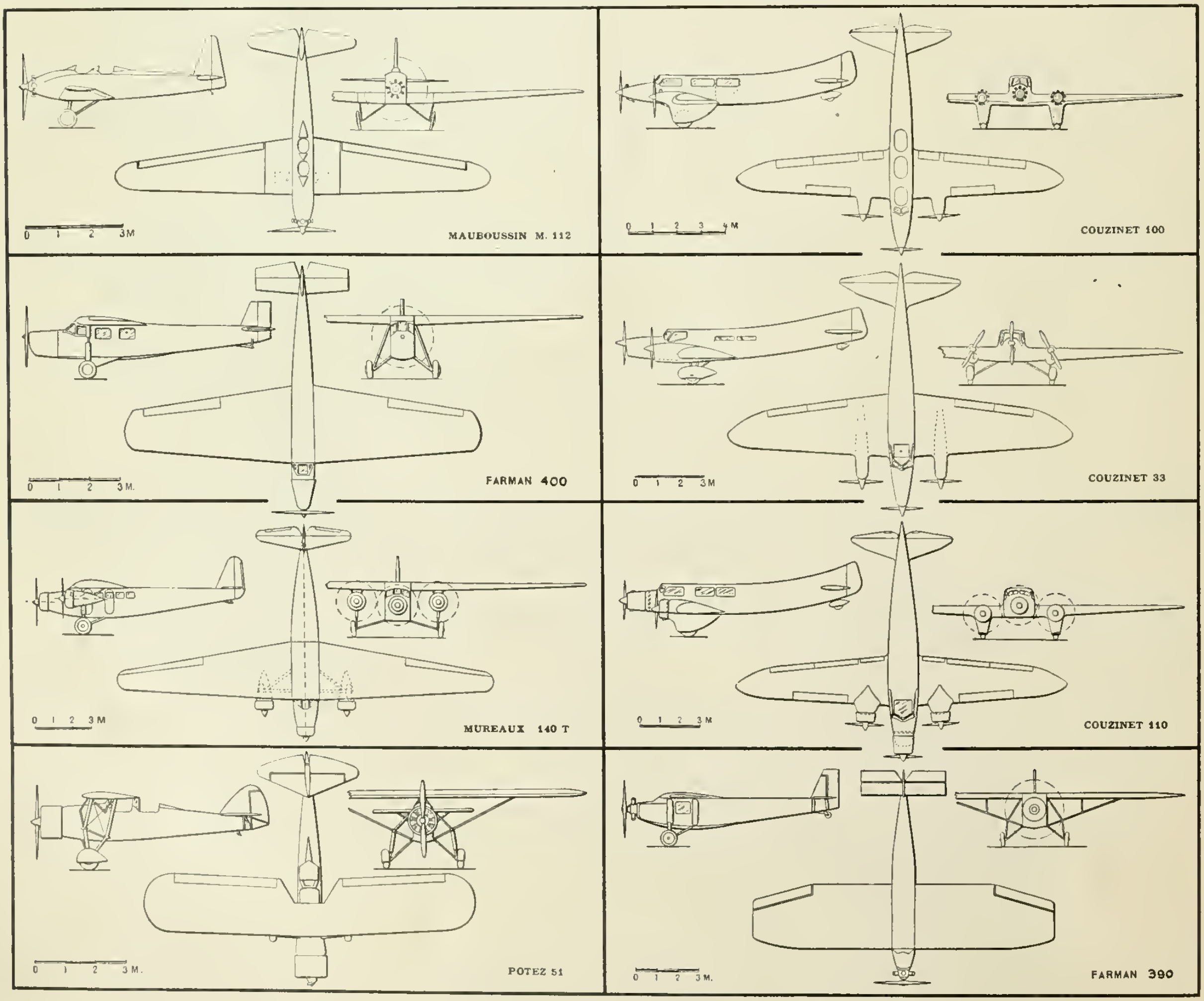
The Use of Models in Research and Design, R. McKinnon Wood. Royal Aeronautical Society Journal, Vol. 36, No. 263, November, 1932, pp. 975-982.

VARIOUS laws of dynamic similarity are discussed which should govern the conduct of experiments with models to reduced scale in aero- and hydrodynamics. The author considers the passage of a body through the air when the body is free from acceleration and develops his arguments from the initial assumption that air is incompressible and frictionless, using the dimensional theory. Taking up the compressibility effects of air, he refers to the varying viscosity and shows that it is on the Reynolds number that the phenomenon depends. He concludes that the small atmospheric wind tunnel is quite unreliable whenever stalling is involved, but apart from this it is good for lift, for pressure distribution, except at the tail, for finding the form of flow, and downwash, but not quite so good for center of pressure. He also takes up gravity, free flight model experiments and the new spinning tunnel at Farnborough.

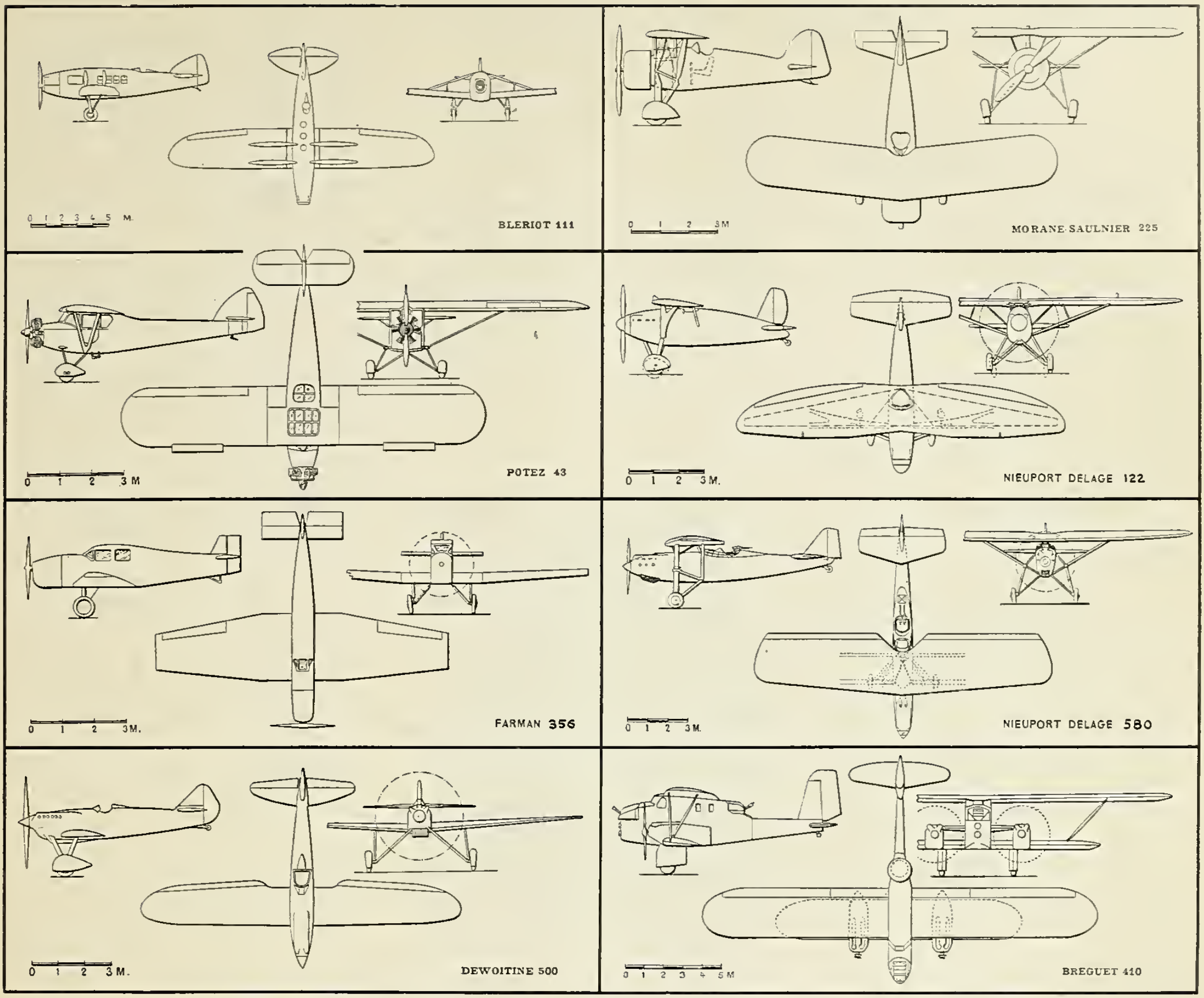
FIRE PREVENTION

Experiments on Reduction of Fire Risk by Means of Induction Pipe Flame Traps, A. Swan, W. Helmore and W. C. Clothier. (British) Aeronautical Research Committee—Reports and Memoranda No. 1484, August, 1932, 16 pp., 15 figs.

COOLING packs for insertion in an engine induction pipe, which were capable of quenching the flame in gasoline-air mixtures, are described. By



Representative single-engined and tri-motored commercial monoplanes displayed at the Paris Aero Show



Some recent types of French airplanes exhibited at the Thirteenth Annual Paris Aero Show

using a special construction of alternate sheets of flat and corrugated metal foil, the resistance to flow has been reduced to a minimum without sacrificing mechanical strength. With the gasoline-air mixtures it was observed that the atomization of the gasoline was considerably improved. Tests on a multi-cylinder engine fitted with flame traps showed no appreciable loss of power at normal speed. Continuous backfire of the most severe type was withstood by the final form of trap for ten hours.

ENGINE VIBRATION

Torsion Vibrations in Airplane Engines (Les vibrations de torsion dans d'aviation actuels), A. Gorfinkel. Genie Civil, Vol. 101, Nos. 15 and 16, October 8 and 15, 1932, pp. 355-358 and 377-380, 9 figs. 8 tables.

SEMI-EMPIRICAL formulas are derived which permit the direct calculation of the critical speeds for the usual types of in-line, V, W and radial engines. The author points out the advantages one would obtain by placing the timer, auxiliary controls and the supercharger near the propeller instead of at the opposite end. He discusses the importance of vibrations and takes into account the effects of the order of firing and also of the angle between the rows of cylinders in the V and W engines.

WING CONSTRUCTION

Wing Construction, H. J. Stieger. Royal Aeronautical Society Journal, Vol. 36, No. 262, October, 1932, pp. 789-812, and (discussion) 812-827, 19 figs.

IN considering ways of saving weight in wing construction, the author limits his discussion to requirements for a careful layout in view of the aerodynamic loads and an efficient structure to transmit these loads. He includes among the fundamental points for aerodynamic layout, weight distribution along the span, plan form taper, careful choice of wing section, best aileron proportions and careful design of wing root. In reviewing the most important wing structures, he covers the B.F.W., Lepere-Weymann, Rohrbach, Fokker, Ford, Junkers and Bristol experimental wing structures.

HIGH-SPEED WIND TUNNEL

Development of a High-Speed Induced Wind Tunnel, A. Bailey and S. A. Wood. (British) Aeronautical Research Committee—Reports and Memoranda, No. 1468, May, 1932, 21 pp., 15 figs.

FURTHER investigation of the possibilities of using the inductive action of the discharge from the compressed-air tunnel to maintain a high-speed wind tunnel is discussed. The object of the present work was the attainment of a longer working section, and a uniformity of speed over the working section. The results showed that the inductive effect of a central conical nozzle, when used alone or in conjunction with an annular nozzle, is not great when compared with that of an annular nozzle taking the same quantity of high-pressure air. Increasing the length of the working section of the original tunnel considerably reduced the maximum speed attainable. It also was found that the efficiency might be raised by increasing the length of the divergent outlet.

(*Continued on page* 50)

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C.

Airplane brake and rudder control. Ralph H. Upson, Ann Arbor, Mich. (1,864,962)

Sail, parachute, airplane wing and the like. Pembroke A. Vaile, Chicago, Ill. (1,864,964)

Airplane. William F. Gerhardt, Ann Arbor, Mich. (1,864,996)

Propeller hub. Sidney T. Carter, Parnassus, Pa. (1,865,170)

Airplane. Jakob Hojnowski, Nekoosa, Wis. (1,865,252)

Parachute, Peter N. Madsen, Brookline, Pa. (1,867,366).

Variable camber airfoil. Herbert J. Hogan, Los Angeles, Calif. (1,868,748)

Aircraft. Mathias Henter and Ernst Kaser, West Allis, Wis. (1,868,832)

Radio direction finder. Geoffrey G. Kruesi, Alhambra, Calif., assignor to Bendix Aviation Corp., South Bend, Ind. (1,868,945)

Propeller drive mechanism. Charles S. Hall, Los Angeles, Calif. (1,868,975 and 1,868,976)

Propeller. Werner J. Blanchard, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,869,182)

Airfoil operating mechanism. Robert R. Osborn, Garden City, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,869,211)

Collapsible wing. Albert J. Roberts, Cleveland, Ohio. (1,869,227)

Airplane. Randolph F. Hall, Rochester, N. Y. (1,869,253)

Combination flying machine and airship. Martin Hines, Brooklyn, N. Y. (1,869,256)

Controllable-pitch propeller. Joseph A. Roemisch, Seguin, Tex. (1,869,280)

Airplane wheel. Joseph G. Swain, Akron, Ohio, assignor to Firestone Steel Products Co. (1,869,318)

Control system for airplanes and the like. Israel Ludlow, Mineola, N. Y. (1,869,326)

Helicopter, Rees K. Williams, Baltimore, Md. (1,869,453)

Method of forming a propeller. Spencer Heath, Elkridge, Md., assignor to American Propeller Co., Baltimore, Md. (1,869,478)

Fuel-supplying apparatus for aircraft. Leon Lefevre and William E. Leas, Chicago, Ill. (1,869,487)

Method of and apparatus for mooring an airplane while in flight to another aircraft. Holden C. Richardson, Cleveland, Ohio. (1,869,506)

Flying machine. Sandor Rosenberg, New York, N. Y. (1,869,867)

Landing sails for aircraft. Herman Hein, Bremen, Germany. (1,870,115 and 1,870,116)

Airplane. George A. Hughes, Havelock, Neb. (1,870,119)

Magnetic brake shoes for airplanes. J. Gafney, New York City. (1,870,286)

Propeller hub and blade mounting. Thomas F. Hamilton, Milwaukee, Wis., assignor to Hamilton Standard Propeller Co., West Homestead, Pa. (1,870,361)

Hub for small propellers. Frank W. Cardwell, Pittsburgh, Pa., assignor to Hamilton Standard Propeller Co. (1,870,401)

Wing. Emmanuel G. Kontos, Chicago, Ill. (1,870,514)

Airplane structure. Herbert V. Thaden, Mount Lebanon, Pa., assignor to General Aviation Corp. (1,870,595)

Storing of airplanes. Winfred M. Pierson, La Grande, Ore. (1,870,744)

Airplane jig. Eliot S. Staples, Glenview, Ill. (1,870,757)

Landing chassis for aircraft. Dr. Michael Watter, New York City, assignor to Chance Vought Corp., Hartford, Conn. (1,870,826)

Horizontally rotatable winged rotor for aircraft. Gerald D. Smith, Toronto, Ont., Canada. (1,870,928)

Airplane. John Squires, Detroit, Mich. (1,871,015)

Liquid-supply means for aircraft engines. Stephen A. Hasbrouck, New Haven, Conn., assignor to Pratt & Whitney Aircraft Co., East Hartford, Conn. (1,871,055)

Variable-pitch propeller. John P. Landrum, Birmingham, Ala. (1,871,124)

Propeller. Marshall A. Smith, Jr., South Bend, Ind., assignor to Bendix Aviation Corp. (1,871,203)

Release for aerial flares. Ernest B. Jones, South Weymouth, Mass., assignor to National Fireworks, Inc., West Hanover, Mass. (1,871,375)

Airplane carburetor. Frank C. Mock, Chicago, Ill., assignor to Bendix Stromberg Carburetor Co. (1,871,460)

Airplane wing. Gene J. Park and George Antol, New York City. (1,871,465)

Marine aircraft. Elmer A. Sperry, Brooklyn, N. Y., assignor to Sperry Development Co. (1,871,476)

Cargo-handling apparatus for aircraft and the like. Manuel Castro, Canton, Ohio. (1,871,495)

Airplane. Mathias Leupold, Jamaica, N. Y. (1,871,538)

Airplane. Sandy Pallotta, Youngstown, Ohio. (1,871,909)

Auxiliary wings for airplanes. Nicholas J. Medvedeff, Larchmont, N. Y., assignor to Aircraft Improvement Corp., New York City. (1,872,163)

Aircraft. Chester U. Palmer, New York City. (1,872,170)

Propeller with automatically variable pitch. Marcel Pillard, Marseilles, France. (1,872,337)

Parachute. Benjamin L. Elliott, Perry Township, Ohio. (1,872,705)

Airplane. Gordon Reel, New York City. (1,872,811)

Airplane. George C. Sullivan, El Paso, Tex. (1,872,845)

Navigation system and method for indicating elevation position of aircraft. Frederick A. Kolster, Palo Alto, Calif., assignor to Federal Telegraph Co., San Francisco, Calif. (1,872,975)

Apparatus for continuously recording the path of flight of aircraft. Reinhard Hugershoff, Dresden, Germany. (1,873,126)

Propellers for airplanes and the like. Luigi Stipa, Rome, Italy. (1,873,505)

Hangar for dirigibles. Gottlieb F. Essig, Philadelphia, Pa. (1,873,562)

Aircraft control apparatus. Harold Haas, Arlington, N. J., assignor to Bendix Research Corp., East Orange, N. J. (1,873,579)

Airplane. Virgil Kutnab, Greeley, Colo. (1,873,651)

Supplemental adjustable wing for aircraft. John F. O'Malley, New York City (1,873,662)

Airfoil. Chet E. Rickard, Anaconda, Mont. (1,873,664)

Hook for aircraft cargo-handling apparatus. Manuel Castro, Canton, Ohio. (1,873,822)

Aerial mail exchange. Lucy C. Ashley, Oklahoma City, Okla. (1,873,917)

Automatic propeller-pitch changer. Chandley W. Lambert, Cleveland, Ohio. (1,874,053)

Roller tail skid for airplanes. Joseph E. Behse, Saginaw, Mich. (1,874,160)

Flying machine safety device. Nicholas P. Bruno, Erie, Pa. (1,874,237)

Airfoil. Edmund P. Gaines, Columbia, S. C. (1,874,278)

Variable-pitch propeller. Edmund B. Moore, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,874,332)

Rocker-box housing. Archie M. Niven, Detroit, Minn., assignor to Continental Aircraft Engine Co. (1,874,338)

Parachute. Solomon L. Van Meter, Jr., Hempstead, N. Y. (1,874,392)

Exhaust silencer. Theodore P. Wright, Port Washington, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,874,406)

Gun mount. Rex. B. Beisel, Tulsa, Okla., assignor to Curtiss Aeroplane & Motor Co. (1,874,422)

Aircraft landing. Harry C. Belleville, Oakland, Calif. (1,874,423)

Aircraft construction. Alfred G. J. Cousineau, Chicago, Ill. (1,874,459)

Airplane. Harry A. Douglas, Bronson, Mich. (1,874,468 and 1,874,469)

Propellers. Spencer Heath, Baltimore, Md., assignor to American Propeller Co. (1,875,597 and 1,875,598)

Propellers. George F. Houston, South Bend, Ind., assignor to Bendix Research Corp. (1,875,606)

Airplane inner-controlled spot-lamp. Robert H. Hummert, Dayton, Ohio, assignor to S. H. Thomson Mfg. Co. (1,875,607)

Airfoil section. William E. Phelan, Kansas City, Kans. (1,875,651)

Motor protector and speed accelerator. Harry C. Pittman, Richmond, Ind. (1,875,652)

Flight control for airplanes. Robert C. Struble, Seattle, Wash., assignor to R. C. Struble Co. (1,875,675)

Aerial safety suit device. Patrick F. Gorman, Central Falls, R. I. (1,875,807)

Gyroscopic airplane. Harvey M. Salisbury, Walnut Grove, and Arthur E. Miller, Sacramento, Calif. (1,875,891)

Propeller. Walter W. Everts, San Antonio, Tex., assignor to Everts Propeller Co. (1,875,998)

Boundary light for airports and the like. Benson R. Shaw, St. Louis, Mo., and Frank Buchanan, Syracuse, N. Y., assignors to Cruse-Hinds Co. (1,876,082)

Aircraft. Howard Tebbs, Baltimore, Md. (1,876,096)

Aerial transportation apparatus. S. O. Spirrier, Carnegie, Okla. (1,876,153)

Landing and beaching gear for aircraft. Leonard W. Winter, Bluebell Hill, England. (1,876,158)

Fog-penetrating televisor. Joseph V. Bayer, Floresville, Tex. (1,876,272)

Device for teaching the principles of airplane controls. Ellis G. Holst, Pinehurst, Wash. (1,876,418)

Airplane construction. Fred G. Schweisthal, Chicago, Ill. (1,876,472)

Aircraft engine. Royal Lee, Milwaukee, Wis., assignor to Lee Engineering Research Corp. (1,876,506)

Internal-combustion engine. Royal Lee, assignor to Lee Engineering Research Corp. (1,876,507)

Variable-pitch propeller. Sidney T. Carter, Parnassus, Pa. (1,876,608)

Wing heater for airplanes. William H. Crossland, Bristol, Pa. (1,876,620)

Automatically adjustable airplane propeller. Joseph R. Desautels, Salisbury, Vt. (1,876,634)

Airplane construction. William F. Deutscher, New York City. (1,876,635)

Aircraft. Reynold Janney, Londonderry, Ohio. (1,876,682)

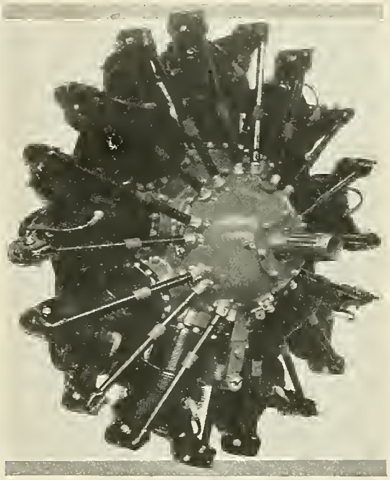
Air-cooling system for airplane engines. Edward S. Marks, Syracuse, N. Y., assignor to H. H. Franklin Mfg. Co. (1,876,996)

Flying machine. Frederick A. Meng, Dearborn, Mich. (1,877,003)

Airfoil and method of constructing airfoils. John K. Northrop, Glendale, Calif., assignor to Northrop Aircraft Corp., Los Angeles. (1,877,022 and 1,877,023)

700 H.P. PRATT & WHITNEY HORNET Series T1C ENGINE

A RECENT DEVELOPMENT of the Series C Hornet has just been announced by The Pratt & Whitney Aircraft Co., East Hartford, Conn., following the receipt from the Department of Commerce of Approved Type Certificates No. 92. Designated as the Series T1C Hornet, the engine is granted by the Department a rating of 700 horsepower at 2,000 revolutions per minute at sea level. The manufacturer's rating is conservatively based on 650 horsepower at the same number of revolutions per minute.



Pratt & Whitney 700 h.p. Series T1C

The Series C Hornet, a standard Pratt & Whitney production engine, with a displacement of 1,690 cubic inches, is the basic model from which the new Series T1C Hornet has evolved. It has been in service for approximately a year and a half with a commercial rating of 600 horsepower and delivering, for military purposes, in excess of 670 horsepower. Only minor modifications and improvements based on the past year's service experience were necessarily incorporated for the development of the T1C Series.

The bare weight of the new Hornet is 840 pounds, which establishes it as having a lower specific weight than any other radial air-cooled production engine in the world. This valuable feature is wholly in accordance with the desire of both military and commercial aviation to increase engine power without altering engine weight.

Standard equipment includes the recently developed control mechanism for the Hamilton Standard hydro-adjustable propeller, which has been built into the engine nose section. It is equipped with combination hotspot and oil temperature regulator as well as inter-cylinder deflectors. Two Scintilla magnetos, Stromberg carburetor, generator drive, propeller hub attaching parts, single tachometer drive, single auxiliary vacuum pump drive and oil pump complete the list of accessories which are standard. Fully equipped, the T1C Hornet weighs 870 pounds.

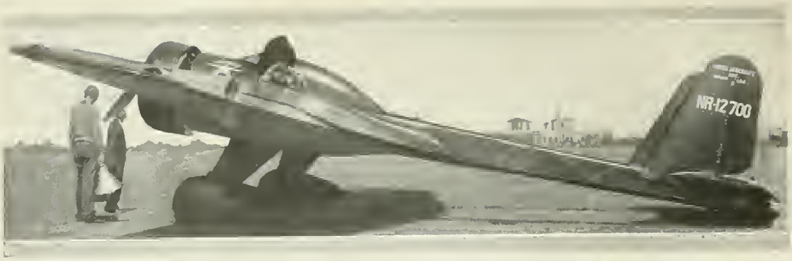
The cylinder head design represents one of the more advanced improvements and changes which have been made in its development. More cooling fins have been incorporated in the head than as it was originally developed on the company's Wasp Junior and used on the fourteen-cylinder, two-row Twin Wasp Junor which was described in detail and illustrated in the April and May, 1932, issues of AERO DIGEST. This permits a considerably larger cooling area and results in a marked reduction in cylinder head temperatures as well as in providing greater strength. As in all models of the Series C Hornet, the conventional forged aluminum two-piece crankcase is used. A case-hardened crankshaft, one-piece master rod, forged aluminum pistons and improved exhaust valves, are incorporated in the T1C models.

Engineered to meet the requirements of the designers and operators of high-performance commercial transport aircraft, the proved dependability of the engine allows it to be classed with the outstanding aeronautical engine developments of the year. It lends itself admirably to projects of manufacturers who are building military and commercial aircraft to compete in European and South American markets.

A brief résumé of the specifications of the T1C Hornet follows:

Specifications

Power at 2,000 r.p.m. (sea level)	700 h.p
Bore	6.125 inches
Stroke	6.375 inches
Displacement	1,690 cubic inches
Compression ratio	6:1
Blower gear ratio	10:1
Weight, bare	840 pounds
Weight, fully equipped	870 pounds
Weight per horsepower	1.20 pounds
Fuel consumption (max.)	.55 lb. p. h.p./hr.
Fuel specification	Octane value 87
Oil consumption (max.)	.035 lb. p. h.p./hr.
Overall diameter	55.437 inches
Overall length	45.656 inches



VANCE "FLYING WING"

By D. A. Martin

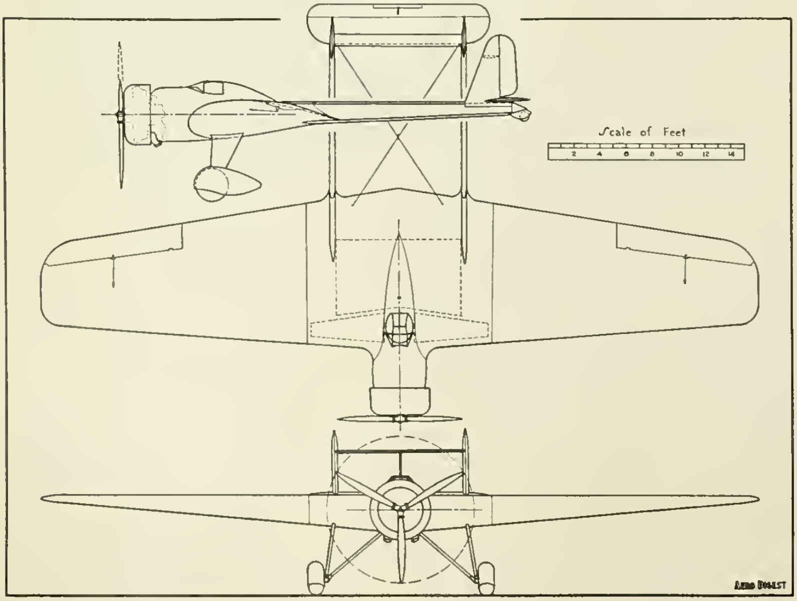
DESIGNED and built by Vance Aircraft, Inc., of Oakland, Calif., the latest Vance "Flying Wing" differs from the ordinary fuselage or body type of plane. The total load of fuel and cargo is carried within the wing itself, thus entirely eliminating the fuselage and its parasite resistance The cargo spaces are indicated in the accompanying plan view drawing by means of broken lines in the center section. Outriggers or booms, centered 10 feet apart and bolted to the rear main spar of the center wing unit carry the tail surfaces. The stabilizer is of biplane design, the lower surface being fixed and to which a single elevator is hinged. The upper horizontal stabilizer is adjustable from the pilot's cockpit and has a range of 10 degrees negative and 10 degrees positive. A streamlined airwheel is attached to the rear termination of each tail boom.

The center unit of the wing and landing gear are of chrome molybdenum tubing structure covered with sheet dural. All tubing joints are welded. The landing gear, which has a tread of 13 feet, is exceptionally clean and is provided with streamlined 29 by 13.5 Goodyear airwheels. Hydraulic or oleo shock absorbers resting on taxi springs absorb the landing shock.

Outer wing panels are of wood construction throughout; box beam type spars are used, the whole covered with 1/8-inch plywood. The wing curve used is different from any other wing curve, one of its features being a reverse curve at the root, which takes care of propeller torque, thus eliminating the necessity for offset vertical stabilizers.

The Pratt & Whitney Wasp engine is supercharged with a blower ratio of twelve to one and a gear ratio of six to one. At 2,200 r.p.m. this engine develops a maximum of 660 horsepower. A Hamilton Standard variable-pitch propeller with a 10 degree pitch range is used.

Designed to meet the requirements of a fast high altitude cargo carrier, the plane is of single-place design, and no provision is made for carrying passengers. It has a top speed of 185 miles per hour and a cruising speed of 165 miles per hour at sea level, this speed increasing at higher levels through the use of the supercharged engine. At the present time ten fuel tanks with a capacity of 1,200 gallons are installed. Two more tanks of 25 gallons each are used for oil. These are of aluminum construction, all seams and rivet heads welded. The fuel and oil carried should be sufficient for a flight duration of 45 hours, or sufficient to travel a distance of 7,200 miles. Performance predictions give the plane (fully loaded with a gross weight of 12,000 pounds) an absolute ceiling of 12,900 feet, service ceiling of 10,500 feet, rate of climb 400 feet per minute for the first 5,000 feet and 175 feet per minute to 10,500 feet. Loaded light (with a gross weight of 4,400 pounds), the absolute ceiling is 36,500 feet; service ceiling, 34,350 feet; rate of climb (sea level to 10,000 feet), 1,800 feet per minute; 10,000 feet to 20,000 feet, 1,200 feet per minute; from 20,000 feet to service ceiling, 400 feet per minute. Fuel consumption is 25 gallons per hour; oil, two quarts per hour.



Scale outline drawings of the Vance cargo monoplane with 660 h.p. P. & W. engine

Specifications

Wing span	55 feet
Wing chord (at center line)	12 feet
Wing chord (at tip)	6 feet
Length overall	30 feet
Normal pay load	2,000 pounds
Gross weight, fully loaded	12,000 pounds
Engine, Pratt & Whitney Wasp	660 h.p.
High speed at sea level	185 miles per hour
Cruising speed at sea level	165 miles per hr.
Rate of climb, loaded	400 ft. per minute
Absolute ceiling, fully loaded	12,900 feet
Fuel capacity	1200 gallons
Flying range	7,200 miles

DIGEST OF FOREIGN TECHNICAL ARTICLES

(*Continued from page 47*)

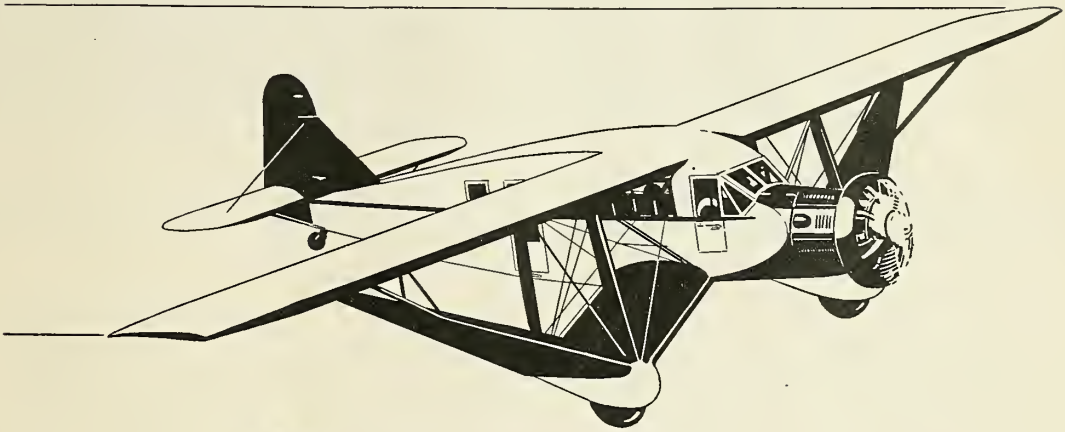
BRITISH AERONAUTICAL RESEARCH

Aeronautical Research Committee Report for the Year 1931-1932. British Air Ministry Report. 95 pp., 5 figs.

RESEARCH undertaken by the Committee during the year and some of the results obtained are described, as well as new laboratory equipment. The major part of the work dealt with the improvement of the means for procuring safety, including investigations of spinning, control and stability at stall, buffeting and wake behind airplane wings, atmospheric turbulence, flutter and the strength and torsion of airplane wings. In the survey of engine research, the efforts being made to reduce the fuel consumption of gasoline engines in flight are indicated.

The elasticity and fatigue research comprises N.P.L. experiments on the behavior of large single crystals of metal under repeated stresses both in air and in corrosive media, a general fatigue research, in collaboration with the R.A.E., into aircraft materials under corrosive influences, and a research into the effect of surface conditions on the fatigue strength of spring steels.

The BEST possible reason for buying a TRANSPORT



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NEW EQUIPMENT and METHODS

VISCOSITY-TEMPERATURE CHART

A VISCOSITY-TEMPERATURE chart has been adopted as a tentative standard by unanimous action of Committee E-10 on Standards, of the American Society for Testing Materials, Philadelphia, Pennsylvania. The chart was prepared by the organization's Committee D-2 on Petroleum Products and Lubricants.

The new standard (D 341-32 T) is designed to incorporate the best features of all the previous charts used. The chart is 16¼ by 21½ inches, covering a temperature range from —30° F. to 450° F. and a viscosity range of 37 to 100,000,000 Saybolt Universal seconds. It is printed on tough, thin paper that permits handling without damage, and it may be ammonia printed or blueprinted.

The A. S. T. M. Viscosity-Temperature Chart is useful for the solution of problems such as those involving a prediction of performance under varying temperature conditions of crankcase oil, free-wheeling lubricant and transmission lubricant. A convenient, accurate kinematic viscosity scale has been placed on the edge of the chart, facilitating the converting of Saybolt seconds to fundamental viscosity units. The chart may be used for other liquids as well as for liquid petroleum products.

ANTI-GLARE ULTRAVIOLET LIGHT

IN conjunction with the Westinghouse Lamp Co., Fish-Schurman Corp., 230 East 45th Street, New York City, has developed a special ultraviolet ray transmitting glass which is opaque to the visible end of the spectrum but highly transmittant in the longer ultraviolet wave lengths. This characteristic, united with the painting of numerals on the dials with an ultraviolet fluorescent paint, makes possible the illumination of the instrument board with a soft glareless light. These ultraviolet ray transmitting filters are furnished in half globe form, designed to fit easily over the standard lamps which are used on the instrument board.

TRANSMISSION DYNAMOMETER

IN THE TESTING of airplane engines and propellers the need arose for a dynamometer of the transmission type instead of the absorption type, because in some cases it is desirable to test a geared engine in which the propeller shaft revolves at a low speed against a propeller running at a higher speed, and in other cases it is desirable to test propellers of higher or lower speeds than the engine speed.

The illustration shows the type of dynamometer developed by the Buffalo, N. Y., division of the Farrel-Birmingham Co., Inc., Ansonia, Conn. The device has a capacity of 1,000 h.p. at 1,000 r.p.m., and it can be used for higher or lower powers at proportionate speeds.

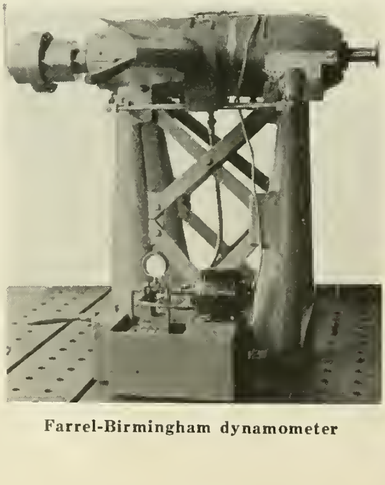
The principle of the dynamometer is based on the reaction of bearings or bearing housing to the tooth pressure of gears. The dynamometer therefore consists of a housing containing two pairs of gears, each pair consisting of an externally toothed pinion engaging an internally toothed gear. The arrangement is such that the driving and driven shafts are in alignment, and there is a lay shaft offset from the main axis. The torque reaction on this lay shaft is measured by means of the torque arm shown in the illustration.

The slipstream from the propeller serves to cool the engine, and for this reason the diameter of the dynamometer housing has to be kept as small as practicable. The limit set for this size of dynamometer was 17 inches in diameter, the relatively small diameter for the high power being transmitted necessitating small gears, which results in high tooth pressures.

The adoption of internal and external gears permits high tooth pressures, due to the relatively large number of teeth in engagement, but notwithstanding this advantage, special materials have been found necessary. The pinions are made in a chrome-nickel, case-hardened steel and the wheels in nitralloy. All the bearings are heavily stressed, and specially selected precision deep-groove double-row ball bearings are used.

Due to the high velocity of the gears and the small size of the gear housing, bath lubrication is not practicable, and therefore oil is pumped into the housing and led to the various parts needing lubrication. After it has served its purpose, it is drained from the housing back to the sump and recirculated.

This apparatus serves a dual purpose; besides its ability to measure the torque, it is designed to measure the thrust being transmitted by the propeller and, alternatively, it is designed to transmit the thrust to the engine. For this purpose the housing can float in the stand and the thrust can be taken against the arm, which serves to measure the amount of thrust.



Farrel-Birmingham dynamometer

The special coupling, shown in the illustration, has been evolved to take up any slight misalignment and, in addition, it serves either to transmit the thrust to the engine or to relieve the engine shaft of thrust. It also is made so that the engine can breathe air through the crankshaft and through the coupling itself.

On the opposite end of the housing the propeller is secured, and its shaft is fitted with interchangeable splined bushes to suit various sizes of propeller hubs.

This transmission-type dynamometer will measure the power actually being used, and arrangements can be made to show by a graph the variation in power requirements of machinery over a period of time.

ELECTRIC HAND POWER SAW

THE Type K-88 Speedmatic Saw, which is easily handled because of its light weight, but at the same time is heavily powered, has been announced by Porter-Cable-Hutchinson Corp. of Syracuse, New York. Designed to rip or cross-cut two-inch lumber at a high rate of speed, the saw has a net weight of 18 pounds. It is equipped with a safety trigger switch, a graduated angle scale, Lubri-Seal precision ball bearings, thumb screw depth and angle adjustments, a pistol hand grip and an adjustable ripping guide. One eight-inch combination saw blade, one eight-inch ripping blade, cable, combination wrench and screwdriver and a carrying case are also included. With a one-horsepower motor, the saw, which is mainly of aluminum or duralumin construction, has an idling speed of 6,000 r. p. m. and a load speed of 4,500 r. p. m.

The company also manufactures a similar Speedmatic Saw, Type K-9, which weighs 23 pounds and is designed to cross-cut a 3- by 6-inch piece of lumber in one second or to rip a 3-inch plank at the rate of 14 feet per minute.

VALVE GUIDE REMOVER

A NEW type valve guide puller has been developed by Air Transport Equipment, Inc., Roosevelt Field, Garden City, N. Y., to remove the steel guides from the Wright J-5 engine heads. This puller makes possible the removal of guides that defy removal by any other methods. The spindle is made of a special heat-treated high chrome nickel steel, and is mounted on a large size Timken thrust bearing.

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Compare Roosevelt's facilities with those of other schools. The picture of the Field (above) shows how extensive it is—a complete, busy aviation center—at which are located over 30 organizations serving the industry; distributors, sales agencies, factories, servicing operators and the *Roosevelt School.* It is the center of aeronautical activity in the East. Train here where the wealth of aviation atmosphere and contact with active operators adds to the educational value you receive.

All flying instruction given at the Field, for sports or professional courses. Field instruction is also included in the Mechanics' Courses. New York City School maintained for mechanics' training and pilot ground work. Convenient terms arranged for all courses.

For complete information about Flying Courses inquire of Flight Manager, Roosevelt Field, Mineola, L. I. For Mechanics' Courses write or 'phone Chief Instructor, 318 West 57th Street, New York City, CIrcle 7-1550.

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3. Expert maintenance on all equipment.
4. Government rated flight instructors of long experience.
5. Regulated, systematic curriculum.
6. Separate student training field.—largest individual area devoted to student flight instruction in the country.
7. Every facility available, including modern hotel on the Field.

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. AERONAUTICAL INDUSTRY .

Miami Center of Air Program

THE GLENN CURTISS SECOND TROPHY and the Colonel Green Cup will be among the awards to be competed for in the Fifth Annual Miami All-American Air Races at Miami, Fla., January 5-7. Cash prizes also have been announced for various contests. Among events of aeronautical interest to take place in Miami at the time of the races, in addition to the contests themselves, are a meeting of Florida airport managers to form a state association, a reunion of World War Birds and night exhibition flying.

The Second Annual Winter Aviation Cruise under the auspices of the United States Amateur Air Pilots' Association and the Florida Year-Round Clubs Handicap Race will immediately precede the Miami races. Both these events will end at Miami, and plans for them are described in detail in the "Private Flying" section of this issue of AERO DIGEST.

Following the races a two-week Fourth Annual Florida Air Tour is scheduled to visit principal cities of the state. The committee on arrangements for the tour, which will be under the auspices of the Florida State Aviation Association, includes the following: E. C. Nilson, Orlando; Wesley Raymond, Lakeland; Jerome Waterman, Tampa; Andrew Heermance, Miami; Frank Wheeler, Fort Myers; Dr. Ralph Green, Jacksonville, and Dr. H. K. Johnson, Tallahassee. Over 100 planes are expected to take part, it was announced recently. A mid-winter air meet is planned to take place at Tampa during the visit of the air tour to that city. The tour will be financed, as in previous years, through contributions by the cities participating.

Piccard to Give New York Lectures

NOT ONLY will Prof. Auguste Piccard speak in Washington January 13, as announced in the December AERO DIGEST, but he will also address two meetings in New York City January 26. Professor Piccard's lectures will be given in connection with the Founders' Day program of the Institute of the Aeronautical Sciences Inc. at Columbia University. Professor Piccard, who holds the world's altitude record, will speak on his ten-mile ascent into the stratosphere and the scientific developments resulting from it.

Fast Plane Being Built for Gehlbach

THE NEWLY-FORMED Detroit Racing Association is reported to be constructing a racing airplane capable of reaching 375 miles per hour for Lee Gehlbach, Detroit racing pilot. The ship, which will cost about $15,000, will be a low-wing monoplane, powered with a single high powered Wright Cyclone nine-cylinder engine. Complete cantilever construction, a retractable landing gear and the enclosure of all moving parts will be featured. When the plane is completed, Gehlbach is reported to be planning an attempt to break the world's landplane record.

Fog-Warning Service Established

THE UNITED STATES WEATHER BUREAU and aeronautical companies have started a cooperative fog-reporting service at San Diego, Calif., to give warning of approaching fogs that would endanger airplanes in flight. The system includes the collecting of information at various emergency landing fields.

State Aviation Officials Elect

R. S. BOUTELLE, Nashville, Tenn., was elected president of the National Association of State Aviation Officials at its second annual convention last month in Nashville. John C. Cooper of Florida was elected executive vice president, and Fred D. Fagg, Jr., of Chicago was chosen as secretary-treasurer.

Regional vice presidents elected included: North central section, Fay Harding, North Dakota; east central section, Floyd Evans, Michigan; southeastern, Steadham Acker, Alabama; northwestern, A. C. Blomgren, Idaho, and northeastern, John D. Sullivan, New York.

Robert Galloway Resigns

THE RESIGNATION of Robert B. Galloway as vice president and chief engineer of the Aeronautical Corp. of America was announced last month. Mr. Galloway had been connected with the company since 1928 and had been in charge of the engineering development of Aeronca planes and engines. He also had served in engineering capacities for the Curtiss Aeroplane & Motor Co., the Bureau of Aircraft Production, The Packard Motor Car Co. and the Engineering Division of the U. S. Army Air Corps.

Alaska's Aeronautical Status

JAMES PEYTON, Department of Commerce inspector, has returned to his Oakland (Calif.) Municipal Airport base after completing his annual inspection tour of Alaska's aircraft, airports and aviators. The northern territory now has thirty-six licensed planes and eight unlicensed aircraft, he reported.

Air Mail Rate to Mexico Announced

EFFECTIVE DECEMBER 1, the air mail rate for articles sent to Mexico, Cuba and the Bahamas is ten cents for each half ounce or fraction, and must be fully prepaid, it has been announced.

COMING AERONAUTICAL EVENTS

January 3-5. Second Annual Winter Aviation Cruise to Miami, Fla., from Hicksville, Long Island, N. Y., under the auspices of the United States Amateur Air Pilots' Association.

January 5. Florida Year-Round Clubs Handicap Race for amateur pilots from Daytona, Fla., to Miami.

January 5-7. Fifth Annual Miami All-American Air Races at Miami.

January 5-7. Meeting of Florida airport managers to organize a state association at Miami.

January 5-7. Second Annual Migration of the International World War Birds Association, Miami.

January 9. Beginning of two-week Fourth Annual Florida Air Tour, starting at Miami and visiting principal cities of the state, under the auspices of the Florida State Aviation Association.

January 14-15. Mid-winter air meet at Tampa, Fla., in connection with the visit of the Florida Air Tour.

January 26. Founders' Day program of Institute of the Aeronautical Sciences Inc., New York City.

February 22. Air carnival and aircraft show at Floyd Bennett Field, Brooklyn, N. Y., for the benefit of the welfare fund of the Early Birds.

February 28-March 4. First Annual New Orleans Air Races, including Curtiss Marine Trophy Contest, during Mardi Gras Week at New Orleans, La.

June 11. International airplane contest at Angers, France, under the auspices of the Aero Club of the West and the Aero Club of France.

June 26-30. Annual meeting of the American Society for Testing Materials at The Stevens, Chicago, Ill.

Wright Cyclone 645-Horsepower Engine

A LOWER-COMPRESSION MODEL of the Wright Cyclone R-1820-F series engines, designed for operation with 73 octane fuel, has been approved by the Department of Commerce under Approved Type Certificate No. 93 for a rating of 645 h.p. at 1900 r.p.m. With the exception of the pistons, which are designed for a compression ratio of 5.35 to 1 instead of 6.4 to 1, this model is identical in all respects, including the blower gear ratio, with the Cyclone model recently approved by the Department of Commerce for an output of 700 h.p. at 1900 r.p.m. with 87 octane fuel.

The pistons used with the 645-h.p. engine are of the same weight as those used with the higher output model; consequently they are interchangeable. This feature will enable aircraft operators to whom the 87 octane fuel required with the more powerful Cyclone is not at present available to use the low-compression engine rated at 645 h.p. with commercial aviation gasoline until such time as the higher octane fuel becomes more widely distributed. The ability to change to the high-compression pistons with rebalancing the rotating units of the engine will permit operators to obtain the additional power inherent in the design of the Cyclone at very little expense.

Early Birds Meet at Gas Craft Club

EVERY FRIDAY is Early Bird Night at the Gas Craft Club, New York City, at which plans were made recently for an air carnival and aircraft show, to be held February 22 at Floyd Bennett Field, Brooklyn, N. Y., for the benefit of the Early Birds' welfare fund.

The Gas Craft Club, located at the Hotel Lexington, is a meeting place for members of the automotive professions, who may there clean up between trips, rest, read, play cards, listen to the radio, entertain friends, typewrite, hold business conferences and receive mail and telegrams.

Japan Orders Kellett Autogiros

KELLETT AUTOGIRO CORP., Philadelphia, has been awarded a contract through its representatives in Japan, Okura & Co., for two type K-3 Kellett autogiros to be supplied to the Japanese Government. These are the latest type machines developed by the company and are to be fully equipped with cabin tops.

The Kellett company recently shipped to Leigh Wade, its representative in the Argentine, a K-3 model autogiro. This is the third Kellett machine to be sent to South America.

Development of Kellett Giro Sky Ads about three months ago and their use by advertisers has resulted in considerable activity at the Kellett plant. This form of advertising consists of an autogiro with a sky banner up to 200 feet in length, accompanied by sound effect and other features. Over thirty contracts have been executed by the Kellett company for local or national advertisers.

The firm has developed several aviation toy specialties, which were primarily intended to give employment in the winter months in the woodworking shop. After these were on the market about a week orders were received from most of the leading department stores in Philadelphia.

Another recent development of the concern is the Aero Seat Back, a patented specialty which has been used extensively at football games.

Aircraft Radio Progress Reported

ACCORDING to the annual report of the Radio Division of the Department of Commerce, there are 121 aeronautical ground radio stations and 350 aircraft radio stations licensed for operation in the United States. Radio-equipped planes are averaging 134,154 miles and are carrying 1,534 passengers and 23,963 pounds of mail each twenty-four hours. Of the total daily mileage flown by radio-equipped planes, forty per cent is during the hours of darkness.

Service Information Bureau Opened

THE EASTERN BRANCH of the Nicholas-Beazley Airplane Co., Inc., of Floyd Bennett Field, Brooklyn, N. Y., has announced the opening of its new service information bureau. This department has been organized to handle without charge all requests covering service information, including data on the cost of material necessary to do particular recovering work or other repair or overhaul work on any type plane.

Brazil Leads in U. S. Exports

AIRCRAFT totaling in value $501,625 were exported to Brazil during October, according to the Bureau of Foreign and Domestic Commerce of the Department of Commerce. Nine thousand dollars were represented in parachute exports to that country, and $86,674 in aircraft parts and accessories. Total aircraft exports for the month amounted to $686,570. Engines valued at $109,306, parachutes valued at $31,542 and aircraft parts and accessories at $188,282 also were exported.

North American Changes Address

EXECUTIVE OFFICES of North American Aviation, Inc., have been moved to 29 West 57th Street, New York City.

DIGEST OF RECENT EVENTS

Fast Flight from Washington to Florida

WITH AN AVERAGE of over 200 miles an hour, Lieut. Cornelius Cousland of Bolling Field flew from Washington, D. C., to Jacksonville, Fla., in 3 hours, 20 minutes. The flight was made in a new Douglas observation plane. (Nov. 27.)

Plane Rescues Men Off Florida Coast

THIRTEEN residents of Miami, Fla., who were adrift on rough seas in two disabled launches were saved by a Coast Guard plane off Cape Florida. Summoned by the plane's radio, a Coast Guard cutter took the men aboard to safety. (Nov. 28.)

International Exposition Ends

THE THIRTEENTH International Aeronautical Exhibition, under the auspices of the Syndical Chamber of Aeronautical Industries, which opened November 18, closed at the Grand Palais, Paris, France. (Dec. 4.)

Roosevelt School Holds Meet

DON MOY, a Chinese student, and Harry Smith were winners of the spot-landing and bomb-dropping contests, respectively, at the first student competitive air meet of Roosevelt Aviation School, located at Roosevelt Field, Mineola, Long Island, N. Y. (Dec. 4.)

Mitchell Urges Aeronautical Program

GEN. WILLIAM MITCHELL, former commander of the air forces of the American Expeditionary Force and ex-director of Army military aeronautics, spoke in Akron, Ohio, on "A New Deal in Aeronautics." He pointed out the advantages of a strong air force in national defense and emphasized the importance of a progressive program for the aeronautical industry. (Dec. 13.)

Amy Johnson Sets Another Record

THE SPEED RECORD from Cape Town, South Africa, to London, England, was exceeded by Amy Johnson, British flier, who a month previously had broken the England-Cape Town record. Flying solo in a Puss Moth monoplane, *Desert Cloud,* she covered the route northward in 7 days, 7 hours and 5 minutes, in spite of storms which delayed her two days. (Dec. 18.)

Italian Flies to 9,500-Meter Height

AN ALTITUDE of 9,500 meters, or about 5.9 miles, was reached by a civilian pilot, Renato Donati, it was reported at Rome, Italy. He is believed to have broken the height record for tourist planes. (Dec. 18.)

West Coast Firm Reports Gain

NOVEMBER was the biggest month for Pacific Airmotive Corp. at United Airport, Los Angeles, since the founding of the firm five years ago, according to President W. E. Thomas, who said sales for this thirty-day period exceeded $38,000. An increase of sixteen per cent for the first nine months of 1932 also was announced. This company serves all the major airlines and private operators in eight western states with parts and accessories.

Pacific Zeppelin Air Service Forecast

PAUL W. LITCHFIELD, president of Goodyear Zeppelin Co., last month predicted a thirty-six-hour airship service between Los Angeles, Calif., and Honolulu, Hawaii, and a six-day service to the Philippines, with a possible extension to Japan and China, it is reported. The line would be associated with four American steamship lines of the Pacific, he stated.

Acroplane Firm Opens Hawaiian Office

GORDON WHITEWAY, northwest manager of the Acroplane company, has sailed for Honolulu, Hawaii, where he will open a branch office for his firm.

Air Photos Help Road Making

AERIAL PHOTOGRAPHY in highway making in Ohio has passed the experimental stage, according to O. W. Merrill, State Highway Director. Mr. Merrill has pointed out three benefits that come from aerial mosaics of contemplated projects: Saving of time by elimination of the old system of running test lines for the most advantageous routes; predetermination of traffic conditions and hazards, and a ready-made exhibit for court use in property damage cases arising from improvement work. Capt. Fred Smith, Ohio Director of Aeronautics, and Lieut. Clyde H. Butler of the 112th Observation Squadron, Ohio National Guard, have cooperated with 450 miles of roads in Ohio last year.

Teletype Schedules Altered

A SWEEPING CHANGE of schedules for the U. S. Teletype Service, by which 555 stations and U. S. Weather Bureaus throughout the nation were made into the world's most efficient weather reporting system, went into effect December 1.

Boston Air Firms Unite

A NEW ORGANIZATION to be known as Ames-Skyways has been formed by the merger last month of the Curtiss-Wright Air Terminals, Ames Aircraft and Skyways, all located at Boston Municipal Airport. Stock in the new company is held jointly by the three firms, who will be represented on the board of directors. Oliver Ames heads the organization, and other officers include Crocker Snow, vice president and general manager; Olcott Payson, vice president in charge of flying activities, and Myron Lewis, treasurer.

Ohio Aeronautical Firm Incorporated

INCORPORATION papers have been issued by the Secretary of State to the Brunswick Air Service, Inc., of Brunswick, Ohio. The company is authorized to issue 250 shares of no-par-value stock. The incorporators are J. L. Littleton, Emma Keller and C. Zimmerman.

Brazil Orders Ten Bellancas

TEN AIRPLANES have been ordered by the Brazilian Government from the Bellanca Aircraft Corp., Wilmington, Dela., according to a recent announcement by the company. The planes, which will cost about $250,000, will be used for photographic work, it is reported. The ships will be of the Pacemaker type and similar to two sent to Brazil last fall.

Buegeleisen Brothers Found New Firm

EXECUTIVES of Strauss & Buegeleisen are being organized in a new goggle and sunglass institution to design and manufacture and to carry on the work of the older firm. The new concern is located at 287 Fulton Street, Brooklyn, N. Y., and is under the direction of Harry Buegeleisen and his brother, Elias.

Company to Make Ryan Parts

MAX A. CONRAD, JR., president of the Conrad Flying Service, Inc., Winona, Minn., has announced the purchase from the receivers of the Detroit Aircraft Corp. of all the unassembled Ryan airplanes and a large assortment of Ryan parts. The company plans to continue the manufacture of Ryan airplane parts and is equipped to overhaul and service this type of airplane.

Firm Features Air Advertising

SKY ADS of Valley Stream (N. Y.) Airport is featuring two types of aeronautical advertising. The Flying Billboard is constructed of vivid red fabric cut-out block letters, distinctly visible at 2,500 feet above the earth, and is towed behind an airplane. The other form of advertising is an electric light sign attached to an airplane.

Aeronautical Programs Broadcast

AN EXCLUSIVE PROGRAM featuring the current events of aviation will be broadcast weekly, by Radio Station KMOX of St. Louis, it has been announced. This station of the Columbia Broadcasting System network is planning to give on Monday, Thursday and Saturday evenings the important news events of the aeronautical industry throughout the world. The new feature, known as "Air Topics," is to have George E. Bounds, sales director of Parks Air College, as reporter and director.

Autogiro Thwarts Burglar

COOPERATING with police in Pennsylvania recently, an autogiro led a pursuit followed by the capture of a criminal. A flight from Pitcairn Field by Pilot George Chambliss directly resulted in the arrest of a burglar who had ransacked a home in Eureka, Pa. The low-flying autogiro forced him to remain hidden in the woods until night, when he was caught trying to escape.

* * *

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TRADE LITERATURE

Aviation Spark Plug Data

A LONG-FELT NEED in the industry is filled by the newly published vest-pocket-size booklet by Hurley-Townsend on the subject of spark plugs. The booklet goes quite thoroughly into the construction of spark plugs in general. Data on servicing spark plugs also is given, with particular reference to mica plugs.

The following headings indicate the complete coverage of the data: Duties, Construction and Design, Servicing, Testing, Reconditioning, Radio Shielding. Four pages are devoted to lists giving data on the fuel octane and spark plug recommended for the most common American aircraft engines.

Shakeproof Screw and Washer Booklet

A CATALOG of Shakeproof lock washers, terminals, screws, bolts and nuts has been published by the Shakeproof Lock Washer Co. of Chicago, Ill. The devices, which feature twisted teeth to insure locking, are pictured and described in various sizes and patterns. Special applications, showing how the Shakeproof locking principle may be incorporated in other production parts, also are illustrated and described.

Flying Instruments Described

AIRCRAFT INSTRUMENTS are portrayed in pamphlets of American Askania Corp. of Houston, Tex., and Chicago, Ill. Written general descriptions are accompanied by photographs and specifications of the instruments. Among devices discussed are compasses, a course-holder steering device, altimeters, airspeed indicators, an optical intercommunication outfit for multi-seater outfit, altitude and air-speed recorders, multiple recorders, revolution counters and theodolites. Separate pamphlets giving full, detailed information also are supplied.

PERSON*AIR*LITIES

(*Continued from page 25*)

scure monthly whose name escapes me at the moment.

After a long period of duty at McCook Field, Warrender dashed into the jungles of commercial aviation. He has been with the Curtiss Aeroplane & Motor Co. (who hasn't?), the Aeromarine Co., and in charge of design at the L. W. F. Airplane Co., with Brock and Weymouth of Philadelphia, aerial surveying, with the Vacuum Oil Co., and then with Curtiss-Wright Flying Service when it first started. He believes that he has serviced more airplanes than any one in the world, as the company at one time had over 750 airplanes and he serviced them all. He had the job of setting up and installing all of the equipment for 40 flying bases around the country, and at one time was maintaining and operating more than half of the Approved Service Stations in the United States, which is a sizeable job in itself. However, he had time to become an original member of the New York State National Guard, and was engineering officer at Miller Field from the beginning. He's still flying with the State National Guard, and has about 2,000 hours' flying time. Last summer, after achieving his ambition of becoming the oldest employee of Curtiss-Wright Flying Service, he resigned to join Casey Jones as Vice President and General Manager of the Casey Jones School of Aeronautics, where we leave him pottering about in his old age, imparting his many years of aviation engineering, mechanical and servicing experience to some of the future mechanics of the industry. I hope he gives the lads full details of how he came to miss that first train on which he was supposed to depart for the Front, and what her name was.

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. FOREIGN NEWS IN BRIEF .

INTERNATIONAL AIRPLANE CONTEST

PRIZES totaling 100,000 francs have been announced for the first of a series of annual international airplane races to be held June 11 at Angers, France, it is reported. First place will go to the plane covering the greatest distance in twelve hours, with a minimum of 1080 miles. The race, which will be flown on a closed ninety-mile circuit, will be held under the auspices of the Aero Club of the West and the Aero Club of France.

Entries will close May 14. They are limited to biplanes with a maximum cylinder capacity of eight liters and a minimum weight of 350 pounds. Planes must hav a crew of two men, and each aviator must carry thirty pounds of baggage.

BERLIN-SHANGHAI LINE TO OPEN

REGULAR mail service between Shanghai and Berlin is planned for the spring. Four airlines will participate in the venture. The Deutsche Lufthansa and the German-Russian Deruluft will carry the mail from Berlin to Moscow, where planes of the Central Russian airlines, Aeroflot, will receive the loads and transport them to Chugutchak on the Chinese border. Planes of the German-Chinese airline, Eurasia, will carry the mail thence to Shanghai and also distribute it to other sections of China.

Frequency of service will be dependent on the volume of freight and mail. It is not planned to transport passengers at first. The line will extend for 6,250 miles, the distance to be covered in five days, which it is hoped later to reduce to three days. Carried by train, mail is now taken from Berlin to Shanghai in seventeen days, and by boat, in six weeks.

AUSTRALIA

INAUGURATION of through service between England and Australia may be expected before the end of this year, according to a recent announcement. Imperial Airways is reported to have the route as far as Singapore, to which city the company will probably extend its India airway soon. The remainder of the airline from Singapore by way of the Dutch East Indies to Port Darwin, which will be the point from which the future internal Australian lines will radiate, is to be decided later. The Inter-Departmental committee has stipulated that contractors or companies operating the Darwin-Singapore or the new internal lines must be British.

ADDITIONAL sums have been approved by the Queensland Employment Council under the Commonwealth States relief loan. They include £12,200 for works at aircraft landing grounds for the Department of Defense at the following centers: Longreach, £5000; Charleville, £1500; Archerfield, £1500; Blackall, £1000; Tambo, £1000; Cloncurry, £750; Winton, £750; Mt. Isa, £500; Duchess, £200.

J. TURNER, of the Hart Aviation Service, Essenden, has carried out exploration work at Tanami and the Granites Goldfields, and as a result landing grounds have been prepared. Both places are now rapidly accessible by airplane.

THE tenth anniversary of the first air mail flights on the regular Charleville-Cloncurry airway of The Queensland & Northern Territory Aerial Service, Ltd., was observed in November. The decade has seen a rise from 112 route passengers and 16 taxi passengers in a year to 654 route passengers and 201 taxi passengers. Air mail carried increased from 440 pounds in 1923 to 3745 pounds in 1931. Total mileage flown annually showed a gain of from 44,838 to 269,233, and freight totaled 41,998½ pounds in the year ending June 30, 1932, while in the year ending June 30, 1922, it was 659 pounds. The company was founded in 1920.

CANADA

TEN months of 1932 showed an increase in the number of private and commercial pilot licenses in force. At the end of October there were 333 private pilots and 420 commercial pilots, as against 292 and 366, respectively, at the beginning of the year. There were on October 31 91 airharbors licensed in Canada, an increase of 13 in the ten-month period. Light airplane clubs had 66 aircraft in operation with 2,633 members. The 23 clubs for the first nine months flew over 9,200 hours, and it was expected that they would equal their last year's figure of 11,507 hours before the end of 1932. They obtained 133 new pilot licenses during the period.

THE FIRST STEPS have been taken to form the new militia air force and reserve in Canada, with the establishment of a unit at Toronto. Squadron Leader G. R. Howsam of Ottawa is to be transferred early this month to Toronto, to form this new aviation branch of Canada's Department of National Defense. Other units are to be established throughout Canada. The plan of the new organization is to give drills, lectures, technical work and mechanical training, and it is expected, some military flying. The first squadron is to consist of twenty to twenty-five pilot officers, as well as from 100 to 175 members of ground force and mechanical crew.

THE first airworthiness certificate issued by the British Air Ministry for an aircraft engine of American design has been granted to Canadian-Wright, Ltd., of Montreal, agents in the British Empire for the Wright Aeronautical Corp. The certificate approved the nine-cylinder Whirlwind model for a rating of 300 h.p. at 2000 r.p.m. This rating corresponds to the output for which the engine was approved by the U. S. Department of Commerce until the recent increase of 30 h.p. was granted, bringing the American approved rating to 330 h.p. at 2,000 r.p.m.

WINTER air mail service to the Magdalen Islands will be run as usual this winter, commencing this month, but planes will leave Charlottetown, Prince Edward Island, instead of Moncton, New Brunswick, as formerly.

The Canadian Airways Company, contractors for the route, have been considering a service linking Charlottetown with Truro, Nova Scotia, and New Glasgow, Cape Breton Island. This would provide all points north and east of Truro with rapid communication with Prince Edward Island.

THE AMHERST (NOVA SCOTIA) Board of Trade and the Town Council have recently decided to establish a municipal airport. The site of the old Victoria Driving Park, which is owned by the town, has been selected for the field.

AIR MAIL service between Charlottetown and Summerside, Prince Edward Island, and Moncton, New Brunswick, has been inaugurated for the winter. The plane leaves Charlottetown at 12:30 p. m., arriving in Summerside at 12:50 and in Moncton at 1:45. It leaves Moncton on the return trip immediately after the arrival of the Ocean Limited from Montreal and a train from Saint John, and lands at Charlottetown at 5 o'clock.

UPTON AIRPORT, Prince Edward Island, owned by Dr. J. S. Jenkins, has been bought by the Canadian Airways. Mrs. Jenkins is the island's only woman flier.

GREAT BRITAIN

THE 1932 Johnston Memorial Prize for navigation has been awarded by the Guild of Air Pilots to Squadron Leader H. J. L. Hinkler of Australia in recognition of his flight across the South Atlantic in 1931.

OXFORD UNIVERSITY Air Squadron has moved its headquarters from Upper Heyford to the new airdrome at Abingdon, which is several miles nearer Oxford. The squadron, which was formed in 1925, consists of undergraduate members with a small staff of Royal Air Force instructors. Every year about twenty-five members complete their training.

AT Air Service Training's school at Hamble, the first of the three-to-four-year courses starts in February and is intended to enable candidates to qualify for their "A" and "B" pilot's licenses, blind flying certificates, ground engineer's certificate, second-class navigator's certificate and wireless license.

A NEW cabin monoplane of the Viastra type is being built for the Prince of Wales by Vickers (Aviation) Ltd. The Prince's ship, which has dual controls, is powered with two moderately supercharged Bristol Pegasus engines and has a maximum speed estimated at about 160 m.p.h. With full load it will be able to cruise for four or five hours without refueling. The plane, which is made entirely of metal, has a capacity of twelve passengers.

OVER 7,000 more passengers were carried by Imperial Airways during the six months ending September 30 than were transported by the lines during the entire year ending March 31, according to the annual report of the company. In the six-month period 37,465 passengers and a ton-mileage of 502,700, also showing an increase, were announced.

THE SPARTAN CRUISER, a trimotored cabin monoplane, powered with three 120-h.p. inverted air-cooled engines, has been produced by Spartan Aircraft, Ltd, The airplane may seat six persons, but removal of the interior furnishings makes the craft instantly available for carrying 1,000 pounds of freight over distances up to 700 miles on one load of fuel. Maximum speed is 135 miles an hour, and the practical ceiling is 13,000 feet.

THE first fully equipped radio station to be erected in Great Britain outside of London for the use of civil air services is planned for Manchester municipal airdrome. Working in conjunction with the radio transmitter and receiver will be a meteorological office, from which weather experts will issue reports at frequent intervals about flying conditions. The wireless station, housed in buildings provided by the Manchester Corp., will have sufficient power and range to communicate with aircraft flying over northwest England, Wales, the Midlands and extending as far as Belfast and Dublin.

Among services to be provided are ground-to-air communication by telephone or telegraph, weather broadcasts, wireless direction-finding for the guidance of airplanes, and a special inter-airdrome service designed to provide information about weather and landing conditions at the chief airports in Britain and Ireland. The transmitting station will be erected at a distance of about one mile from the airdrome and will be operated through a remote-control system by the air traffic officers in the airdrome control tower.

The transmitter is designed to work on wave lengths ranging between 700 and 1550 meters. Provision is made for rapid switching to any one of the five wave lengths required for the various ground station services.

AN ENTIRE squadron of multi-engined bombing planes in the Royal Air Force employs the Smith automatic pilot, a mechanism which steers an aircraft with accuracy on any set course.

The Smith pilot works on the principle that any deviation from a line defined in space may be detected by means of a gyroscope. In the Smith automatic pilot the gyroscope movement is employed to operate two piston valves, the pistons being connected to the gyroscope rings while the cylinders are carried on the frame. When the airplane changes attitude from the set course, the relative movement between wheel and frame operates the valves, which in turn control actuating cylinders linked with the aircraft flying controls. The motive power employed is compressed air, supplied by a small windmill-driven compressor. Course or attitude of the aircraft can be varied by simple movements of devices connected with the automatic control.

THE air-cooled "Rapier Mark II" engine of D. Napier & Son, Ltd., has a unique arrangement of cylinders, which are grouped in banks in the form of the uprights of the letter "H." In this engine, which has 16 cylinders grouped in four banks of four, the frontal area is limited to only four very compact cylinders.

At a height of 10,000 feet the new engine, which is supplied with fuel through a supercharger, develops 305 h.p. Its total weight is 720 pounds.

RUSSIA

DERULUFT, a joint German-Russian airline operating between Berlin and Moscow, has placed in service two new A.N.T. 9 trimotor planes powered with Wright Whirlwind engines of 365 h.p. These planes, designed and built in the aircraft factories of the U.S.S.R., are the first to be delivered on an order of six placed several months ago by Deruluft. Delivery will soon be taken on the remaining four, which also will be powered with Whirlwind 365-h.p. engines.

Carrying ten passengers and a crew of two, the A.N.T. 9 has a cruising speed of 125 miles per hour and a top speed of 138 miles. It is of all-metal construction and is very much similar in external appearance to the Ford trimotor except that the outboard engines are mounted in the leading edge of the wing. All three engines are equipped with anti-drag ring cowls which are said to increase the speed by 5-10 miles per hour.

The interior of the passenger cabin closely approximates that of American transports. Comfortable wicker seats are provided, and windows are fitted with curtains. A leather pocket attached to the rear of each seat contains magazines and other reading matter. Ample space for incidental baggage is provided by overhead racks. A fire extinguisher is carried in a convenient location on the partition between the cabin and pilot's cockpit.

Brief specifications are as follows: Gross weight, 13,000 pounds; wing span, 79 feet; wing area, 904 square feet; height, 17½ feet; length, 56 feet. The plane has a range of about 600 miles.

Russian A.N.T. 9, powered with three Wright Whirlwind 365-h.p. engines and operating between Berlin and Moscow

American-Swedish News Exchange photo

Swedish Flying Industry Junkers type all-metal plane, powered with three Pratt & Whitney Hornet B engines totaling 1,716 horsepower

FRANCE

FRENCH, British, Italian and Polish airplanes formed the featured exhibits at the Thirteenth International Aeronautical Exhibition under the auspices of the Syndical Chamber of Aeronautical Industries, in the Grand Palais, Paris, France, which closed last month. Further details and drawings of exposition planes appear in the technical section of this issue of AERO DIGEST.

ITALY

IN ORDER to commemorate the crossing from Italy to Brazil of the fleet of Italian Air Service planes in 1931, five free scholarships at the Royal Aviation Academy of Caserta have been offered to Italian young men residing abroad. Applications should be addressed to the Italian consulates or embassies.

RATES have been lowered on the Societa Aerea Mediterranea airlines and on the routes of the Nord-Africa Aviazione. The former operates services out of Rome, Tunis, Venice and Tirana, while the latter's lines extend from Bengasi to Tripoli and Tobruk.

GERMANY

NINETEEN German and fourteen foreign European cities are served under the winter service schedule of the Deutsch Luft Hansa. For the first time the routes between Munich and Venice and between Stuttgart and Frieburg are being flown in the winter. The Stuttgart-Geneva-Marseilles-Barcelona service is being operated through the season, and special planes fly with mail and freight shipments between Germany and the Balkan countries and from Vienna to Athens.

DR. HUGO ECKENER is reported to be planning to go to the Dutch East Indies this month for the purpose of studying the feasibility of opening an airship service between Batavia and the Netherlands. He has been invited by the Royal Dutch Airlines to make the trip.

CONSTRUCTION is proceeding on the LZ-129, which is to be the world's largest airship. Being built for trans-Atlantic service, the ship will be about twenty-seven feet longer than the *Akron.*

SOUTH AMERICA

A GERMAN-BRAZILIAN group is planning the inauguration this month of a new airline connecting Parana, Argentina, and Santa Catharina and Sao Paulo,

COLOMBIA'S first civil flying school has been opened at Bogota. All equipment is to be of American manufacture.

JAPAN

THE Manchurian Air Transport Co. has opened an airway in connection with that of the Japan Air Transport Co. from Shingishu in Chosen to Tsitsihar in Manchuria, passing through Mukden, Shinkyo and Harbin, a distance of 995 kilometers. Six trips a week are made, and the journey requires thirty-one hours.

ANOTHER AIRLINE from Mukden to Dairen is scheduled to be opened by the Manchurian Air Transport Co. on January 4. A branch line is operated from Shinkyo to Ryuseison, stopping at Chilin and Tunha.

HOLLAND

THE K. L. M. COMPANY has introduced a new and faster type of Fokker plane on its European-Iraq-Java service. The new planes are of the three-engined Fokker XVIII type, having three Wasp engines of 420 h.p. each. The machines are designed to cruise at 125 m.p.h. and have a top speed of 156 m.p.h. In order to obtain the increase of speed, the fuselage has been constructed longer and slimmer, necessitating a slight alteration in the arrangement of the passenger seats and tables in the cabin.

On its new schedule, the K. L. M. hopes to reduce the time between Amsterdam and Karachi to three flying days, between Karachi and Calcutta to one day and between Karachi and Burma to two days.

MEXICO

IN AN effort to encourage the maintenance of regular aviation passenger, mail and express services in the country, Provisional President Gen. Abelardo L. Rodriguez has issued a decree providing for subsidies of four years each for the air transportation companies. These subsidies will represent sums equivalent to payments by the companies of the six-centavo-per-liter tax on gasoline used by their transport planes during the year.

FEDERAL soldiers and the townspeople are conditioning a landing field at Ixtlan del Rio, Nayarit. The field will be available for both commercial and military planes. The building and maintenance costs will be borne by the State and Federal governments.

DONALD MOIL, American aviator, is negotiating with the Federal Government and the authorities of Sonora State for a concession to establish a fish aerial express service between Guaymas, Sonora, and cities of Texas. He proposes to build a landing field at Guaymas, where he will load fresh fish and sea food in especially constructed refrigerator planes that will have a cargo capacity of from three to four tons each. Service is planned for two or three times weekly at the outset and daily later if needed.

A MODERN landing field has been established at Navolato, Sinaloa State. Although the field was constructed under the auspices of the War Department, it is available for civil fliers and aviation companies and has such facilities as radio, telephone, telegraph, post office, repair shops, fuel and lubricant storehouses.

THE Ministry of Communications and Public Works has announced that efforts are being made to complete and place in service several well planned airports, landing and emergency landing fields in Jalisco and Michoacan states in the West and Middle West. These works are being done by state and municipal governments, residents of the towns which they serve in many cases donating their labor, under the direction of a special technical commission the Ministry has appointed.

COL. ALFREDO LEZAMA, former commander of the second air regiment of the Federal Army Air Service, has been appointed Inspector General of Airports and Landing Fields of the Ministry of Communications and Public Works.

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AIR—HOT AND OTHERWISE

(*Continued from page* 17)

hustle. Maybe someone will find an opening and, before the time limit has gone by forever, present the case of aeronautics in its entirety to the Commission. Here in the AERO DIGEST offices we are optimists, and therefore we are inclined to be hopeful.

The railroads, the buses and the water-transport groups were not asleep. Not those boys! I have before me a "clip-sheet" of editorials from newspapers throughout the country showing how intelligently the railroads are fighting their fierce battle against the great gas wagons on the highways. A very little fighting as intelligent as that would win many battles for the aeronautic industry.

Won't someone please set the alarm clock so that it will go off at an early date—and put it on the little table close beside our Aeronautic Chamber's too slumberous bed?

Will Brother Somebody please lead in prayer and mention that the annual meeting of the Chamber will be held during January? New officers will be elected to spend your dues for 1933. If you are interested in an economical and efficient administration in the future of YOUR Chamber, it might be advisable to attend that meeting.

MAPS FOR AIR NAVIGATION

(*Continued from page* 16)

of the terrain could be shown with a minimum degree of distortion, if distances could be scaled accurately and with a uniform scale on any part of the map, if radio bearings and radio ranges could be shown as straight lines, if the use of supplementary maps in laying out great-circle courses could be avoided, and if geographical positions could be easily plotted.

As a result of this study the Lambert conformal conic projection, with standard parallels of 33 degrees and 45 degrees, was selected. This "projection is of the simple conical type in which all meridians are straight lines that meet in a common point beyond the limits of the map, and the parallels are concentric circles whose center is at the point of intersection of the meridians. Meridians and parallels intersect at right angles and the angles formed by any two lines on the earth's surface are correctly represented on this projection. It employs a cone intersecting the spheroid at two parallels known as the standard parallels for the area to be represented. In general, for equal distribution of scale error, the standard parallels are chosen at one-sixth and five-sixths of the total length of that portion of the central meridian to be represented."*

A uniform border scale of statute miles is provided and may be used in measuring distances on any part of these maps. Minutes of latitude are practically uniform and one scale applies throughout. As on the surface of the earth, minutes of longitude vary with the latitude, hence separate scales are provided for each 30 minutes of latitude for use in plotting geographical positions.

Within the practical limits of navigation, straight lines connecting any two points on these maps or on a consecutive series of these maps joined together, follow the arcs of great circles and therefore represent the shortest and most direct courses between points in question. Radio

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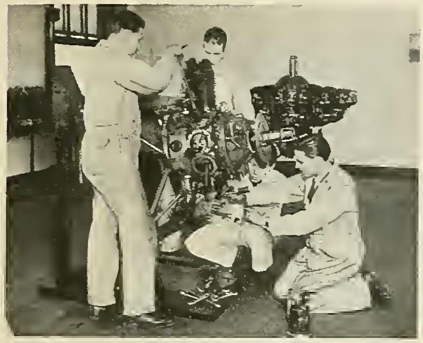
*From "Elements of Map Projection" by Charles H. Deetz and Oscar S. Adams. Special Publication No. 68 of the Coast and Goedetic Survey of the United States Department of Commerce.

(*Continued on following page*)

Wing Construction and Recovering



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(Continued from preceding page)

ranges, visual ranges, radio bearings and visual bearings lie in the planes of great circles, hence are represented on these maps by straight lines. Bearings are plotted using the meridian nearest the observer. When radio bearings are determined at and transmitted from radio direction finder stations they should be plotted from those positions.

Great-circle courses, excepting courses following meridians, intersect successive meridians at different angles, therefore such courses are slightly but constantly changing. By no method other than steering a range is it practicable to make these small changes as they occur, and thus follow a true great-circle course; therefore they are permitted to accumulate and are corrected by changes in course at appropriate intervals. This results in rhumb-line courses between intermediate points on the great-circle. The rhumb-line track departs from the great-circle track a maximum amount in easterly and westerly courses, and on this series of maps may equal as much as 0.3 mile at the middle of a 100-mile course. Rhumb-line courses between any two points are measured from the meridian nearest half-way between the points in question.

In compiling the first draft of its air navigation maps, the Department of Commerce draws upon all available maps of the regions involved. Important source maps used include those of the Coast and Geodetic Survey of the Department of Commerce; the Geological Survey and the General Land Office of the Department of the Interior; the Forest Service, the Bureau of Chemistry and Soils, and the Bureau of Public Roads of the Department of Agriculture; post-route maps of the Post Office Department; State, County, railroad, automobile, and other maps produced commercially, and maps of power-transmission lines. Advantage is also taken of aerial photographs and other sources of information.

Proofs are made of the compilations and taken into the field for careful systematic flight checking by an especially trained cartographic engineer and a thoroughly experienced pilot, flying together. The resulting corrections and additions, which frequently give emphasis to features that would otherwise have been omitted as unimportant, are incorporated in a master compilation from which the maps are reproduced by the usual lithographic processes.

The provision of suitable air navigation maps, in addition to being a constructive contribution to the advancement of aeronautics, is an important step in carrying out the universal program of supplying facilities necessary to make possible the reaping of the fullest benefits from each new development in the field of transportation.

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NINE WONDERFUL SHIPS at bargain prices. J-6 300 h.p. Ryan B-5; J-5 taper wing Waco; brand new 45 h.p. Szekely Buhl Bull Pup; Warner 100 h.p. Inland Super Sport; J-5 straight wing Waco land or seaplane; Kinner K-5 100 h.p. New Standard trainer; OX-5 Travel Air, with airwheels; J6-7 240 h.p. four-place Verville cabin ship; J-6 165 h.p. Curtiss Robin land or seaplane, like new. All ships NC licensed, excellent condition and priced to sell. Terms to responsible buyers. Write or wire Becker-Forner Flying Service, Inc., Jackson, Michigan.

STINSON JR. LYCOMING, just relicensed. 250 hours; 75 hours since factory overhaul. Finish and upholstery perfect. Steel propeller, electric starter, air speed. Motor and ship guaranteed good condition. Owner needs cash, will go to first reasonable cash offer. P. O. Box 53, Bethesda, Maryland.

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FOR SALE: Short nosed center section Kinner K-5 American Eagle. Attractive show job. $1000. Five place J-5 Ryan, $1100. J6-5 Eaglerock, $1200. Two OX jobs, just recovered: Waco 10, $500 and Parks, $450. Indiana Air Service, Municipal Airport, South Bend, Indiana.

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WANTED: Portable steel hangar. Preferably large enough to house Curtiss Sedan and Travel Air 2000. Would also consider hangar accommodating one ship. State make, size, age, price and where hangar can be inspected. Groves Flying Service, Muscatine, Iowa.

WANT: Cardinal or Monocoupe. Write, giving complete description, serial number, list extra equipment, lowest cash price. F. W. Bower, Fowler, Indiana.

WANTED: Set of dual controls for OX Robin; also, steel Hamilton or Standard Steel used propeller for OX-5. Fred M. Roberts, Jr., 214-214½ Main, Bismarck, North Dakota.

WILL PAY CASH for Warner, Kinner, OX or other low-powered licensed airplanes. Must be extraordinary bargains. Indiana Air Service, Municipal Airport, South Bend, Indiana.

WANT LYCOMING STINSON or other good four or six-place ship. Send full details and lowest cash price first letter. C. C. Whittaker, Conant Hotel, Omaha, Nebraska.

WANTED: Warner engine; prefer late model. Consider one needing repairs or overhaul. Must be bargain. Joseph E. Aspden, 20 Delaware Avenue, Hamilton, Ontario, Canada.

AERIAL MAPPING CAMERA and equipment wanted. LeBlond 90 and Cirrus motor for sale. Swallow Airplane Co., Wichita, Kansas.

WANTED: Used Tank aero motor number 63. Describe fully in first letter. State lowest cash price. Meriwether Aircraft Corporation, Box 236, Manchester, Georgia.

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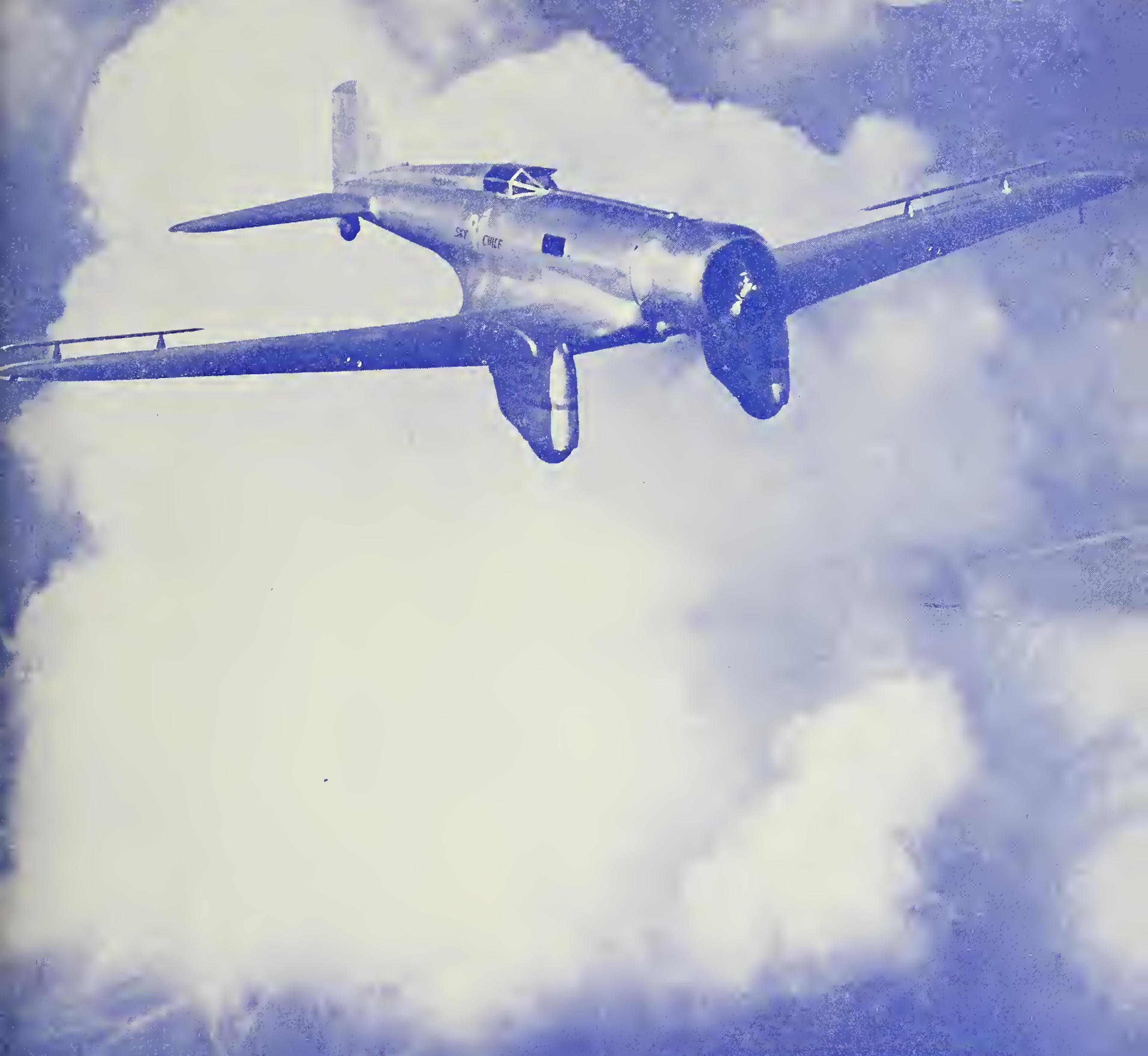

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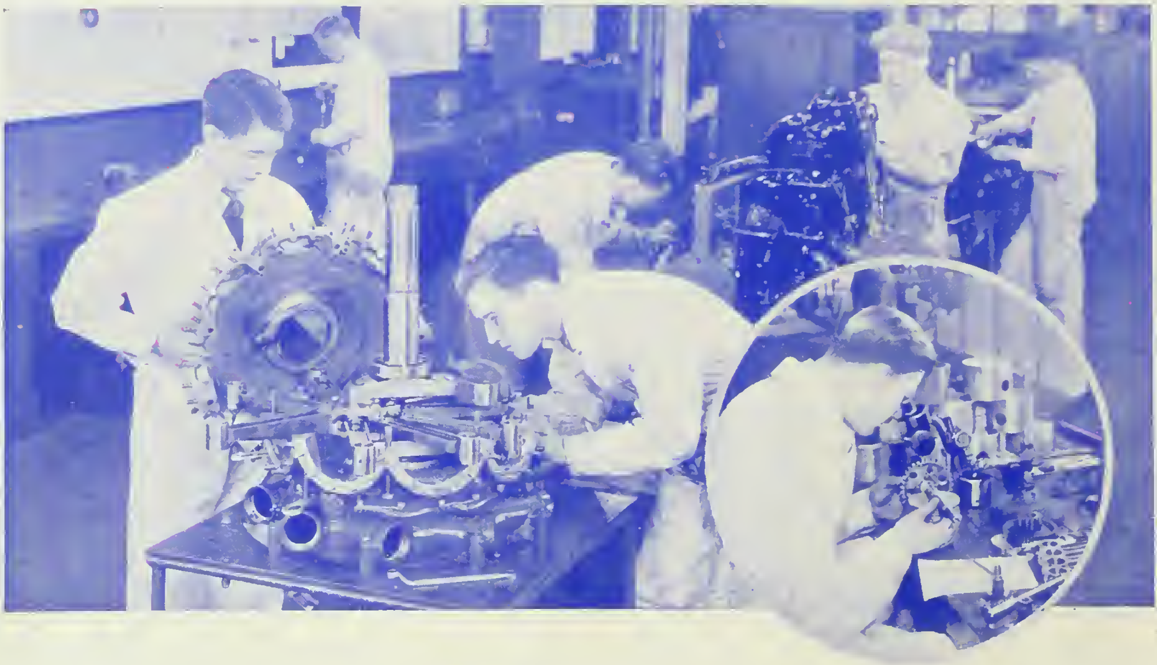

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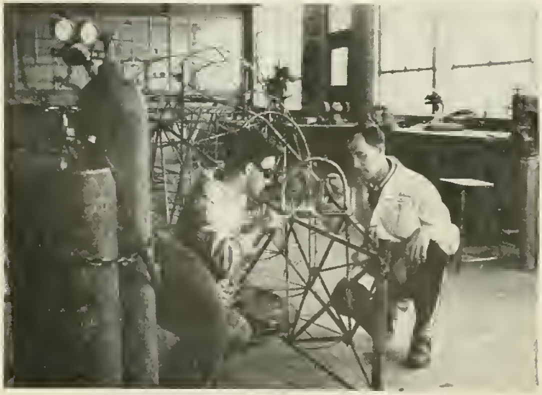

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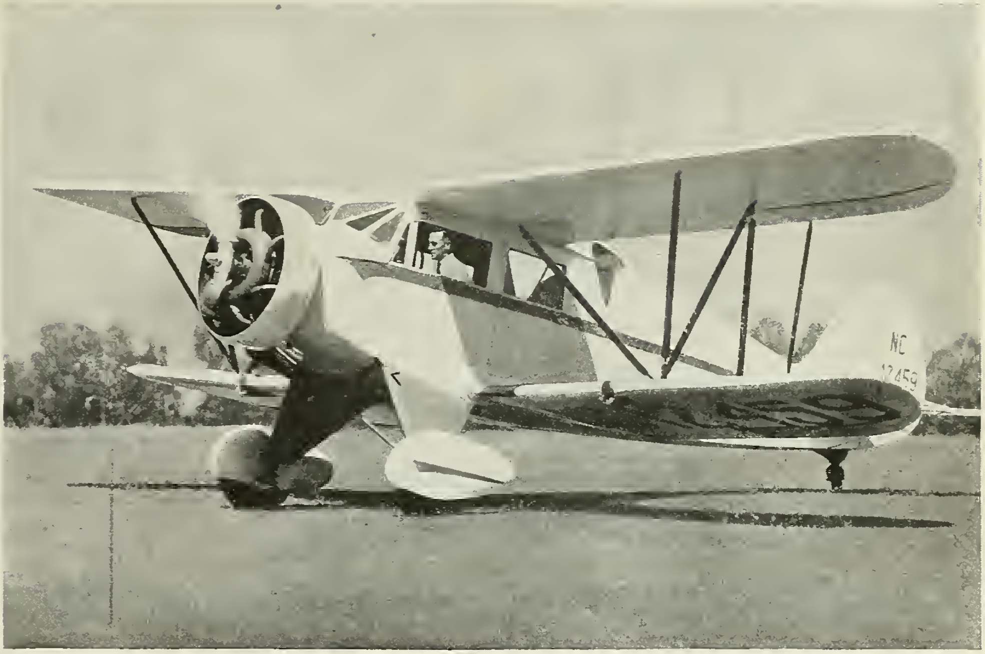

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	2nd	Roy Liggett
	3rd	John Livingston
500 Cu. In. Sportsman Pilot Race	1st	Tony Little
	2nd	Jack Wright
	3rd	William Rausch
Free for All Sportsman Pilot Race	1st	Eric Wood
	2nd	Ben Stengall
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Womens Race	1st	Betty Lund
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AN INFORMAL SCENE—as photographed thru the loggia of the Administration Building, Ryan School of Aeronautics, Jan. 9, 1933.

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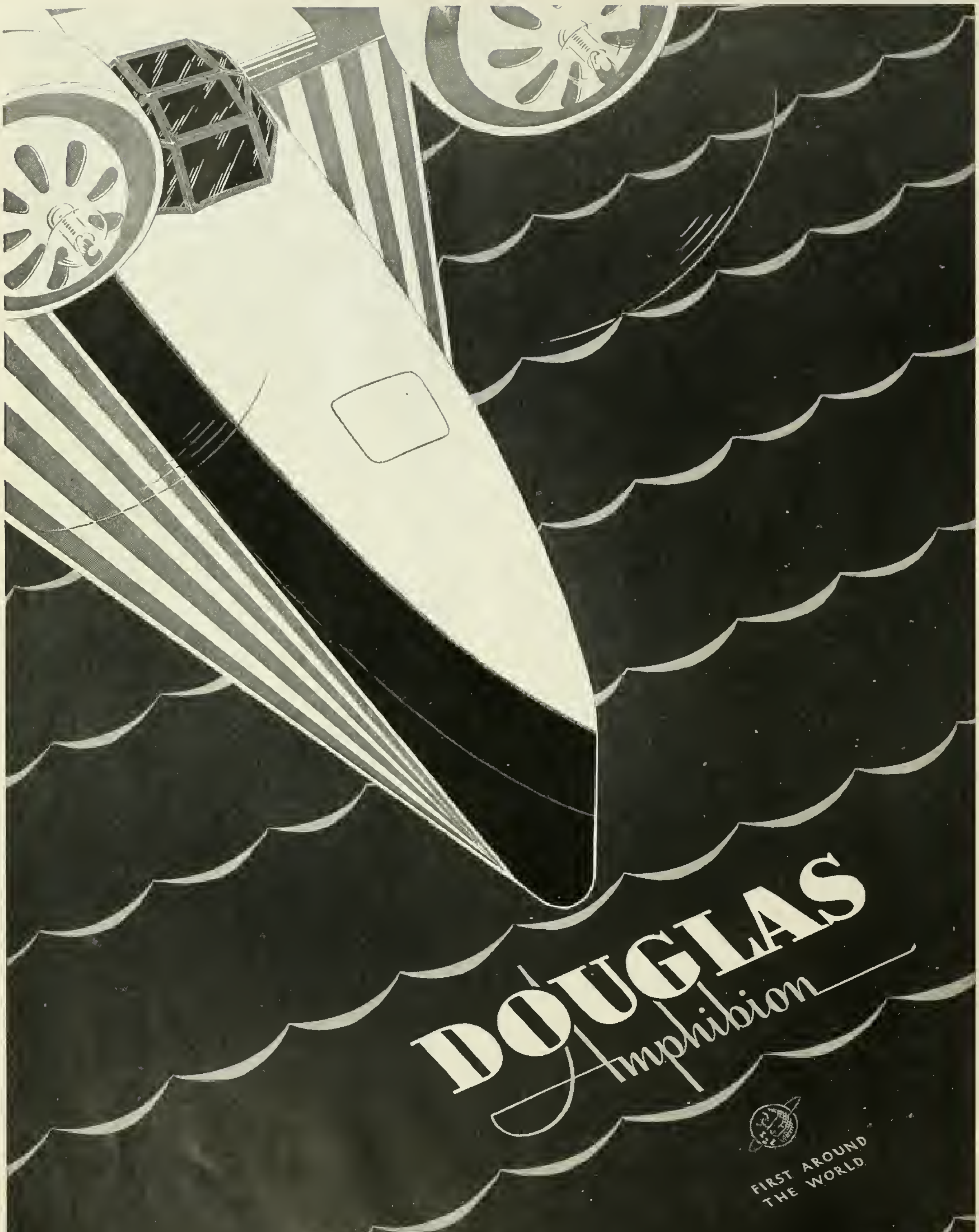

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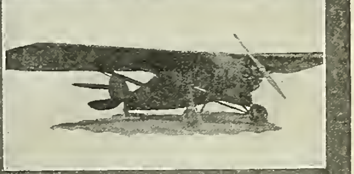
STINSON CABIN CROSS COUNTRY SHIP

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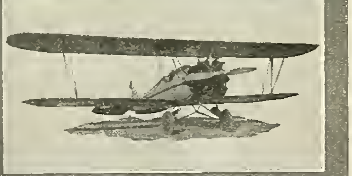
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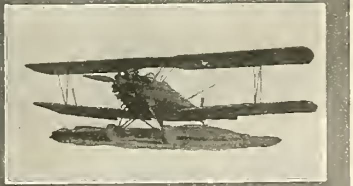
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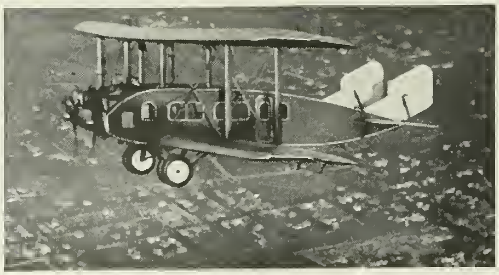
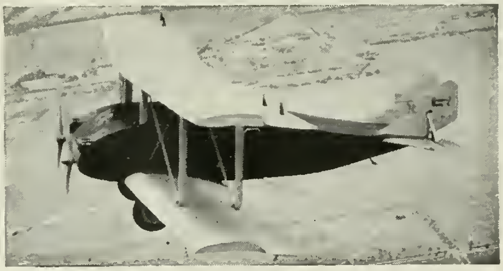
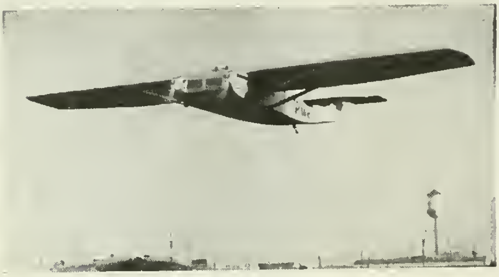


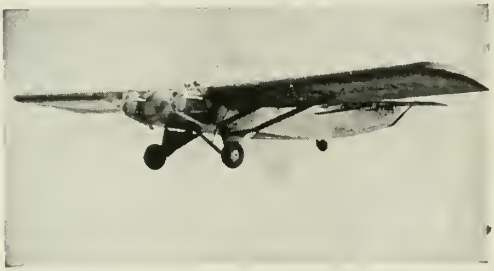
1920—*The RB-1, first airfoil fuselage center section.*



1924—*The RB-2, first air freighter. Corrugated metal construction.*



1927—*The CB-16, first multi-engine design with retractable landing gear.*



1930—*The UB-20, first American transport with flat stressed skin construction.*

The Design Basis of the Burnelli Type Airplane

THE effect of merging the required frontal drag areas of the conventional type fuselage with side multi-engine installations into unified body or drag frontal area greatly increases the useful body cross sectional area, hence *cabin volume capacity*, which is about doubled.

Forming the wide body cross sectional area into airfoil contour causes it to generate lift in excess of the wing area it replaces, which, for the 1200 horsepower type, equals 180 square feet. This lift effect was proven by thorough wind tunnel research and in full flight. Lift of the body therefore reduces its parasite drag area per horsepower in proportion to the lift and equivalent frontal area of a normal thickness airfoil. The extent of this favorable aerodynamic influence *reduces the non-lifting drag increment of the body about 50%*, or, for a body 5′ high by 12′ wide (60 sq. ft. frontal area) to 2½′ by 12′ (30 sq. ft. frontal area) resulting in the extremely low value of 15 sq. ft. of body cross sectional area for each 600 horsepower engine installed.

The extra wing frontal area added as an appendage to and below the wing center section, having width and height sufficient for propeller spacing and engine housings, in combination with the normal cantilever wing thickness, enables the wing structure and covering to envelope a large percentage of the cabin volume, as wing space structure and covering is used to contain cabin volume. The wing area saving provided by the airfoil body, replacing the area of 12′ wide by 15′ chord (180 sq. ft.) equals a wing weight of 2 lbs. per sq. ft. at the root section, totaling 360 lbs., which weight saving is directly contributed to *increased cargo space or payload capacity.*

For single engine relation, assume that two round streamlined bodies of the conventional high speed 600 h.p. single engine type, each with 20 sq. ft. frontal area, are spaced apart sufficiently for duplex propeller clearance, thereby doubling the power and all areas. The upper and lower dimensions then joined provide a wide uniform frontal area to transform into a short airfoil section merged with the upper wing contour of the outer airfoil, in contrast to the round streamline principle. While retaining the same load per horsepower and per sq. ft., the frontal area of the airfoil body type would equal 60 sq. ft., or 20 sq. ft. in excess of that of the two separate round bodies. The lift effect of the body represents 30 sq. ft., which is to be deducted from the non-lifting drag and results in a saving of 10 sq. ft., or 5 sq. ft. for each engine installed; consequently, the largely increased volume obtained by the greater useful frontal area is achieved *without increasing the non-lifting resistance and with an advantage in general aerodynamic and structural efficiency.* Further, the efficiency of the high wing type monoplane is achieved in combination with full landing gear retraction. Other practical advantages relative to safety, accessibility and simplicity are direct results which amplify the efficiency and economic advancement of this design trend.

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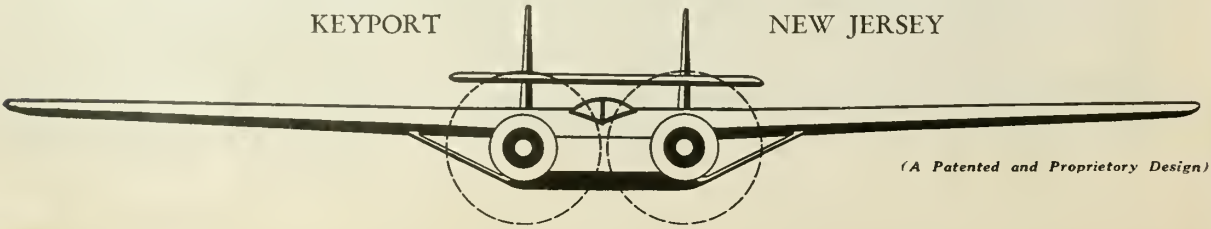

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(Lower photo courtesy of Aerial Explorations, Inc.)

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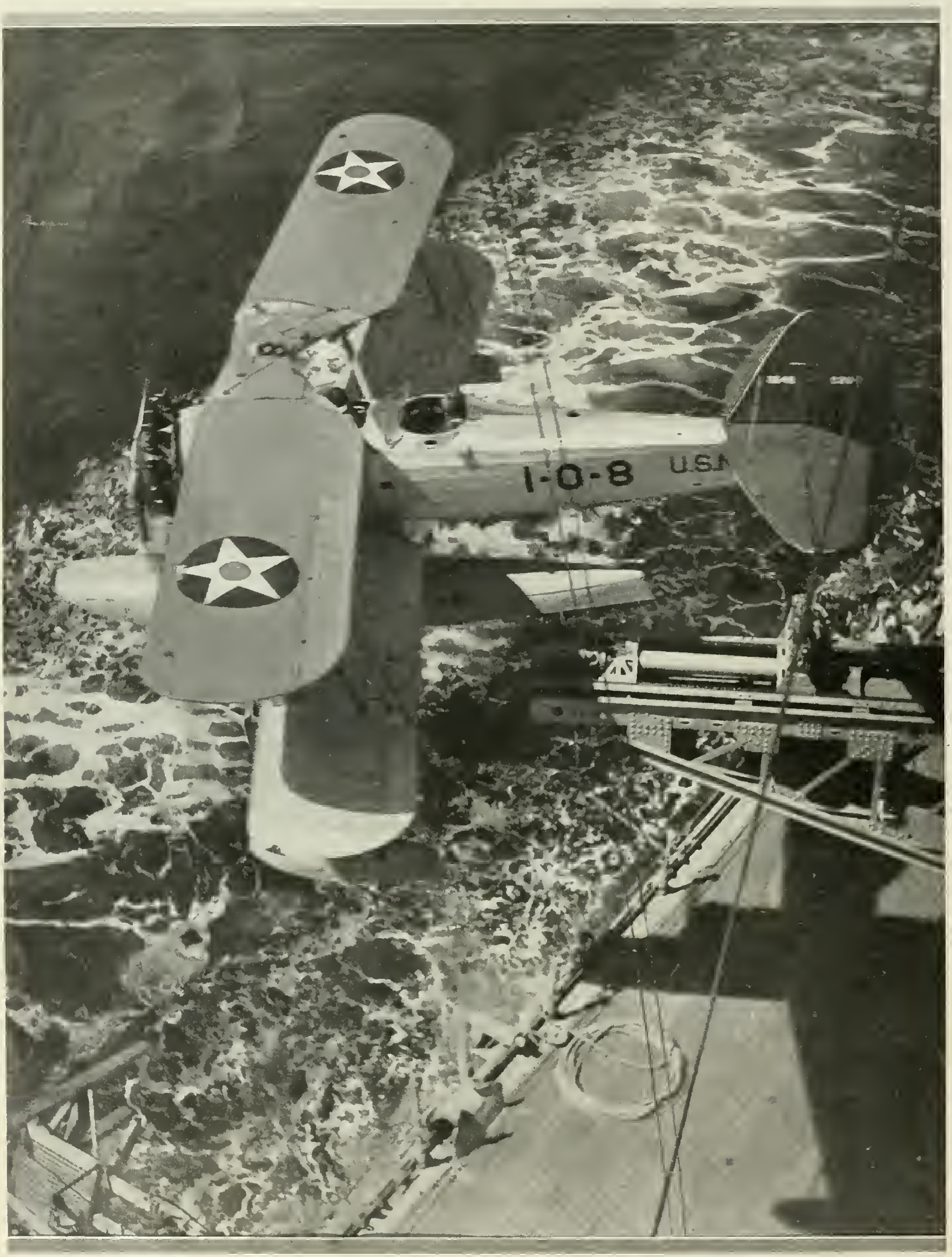


Acme Photo

A Vought Corsair Seaplane Leaving the Catapult Aboard the "U. S. S. Oklahoma"

AIR—HOT AND OTHERWISE

RETAIN ADMIRAL MOFFETT

◉

Frank A. Tichenor

HARD TIMES should be the signal for economy, but not even hard times should be accepted by a great nation as a high sign for letting its chief defensive equipment fall into such inferiority that if an enemy arose that nation might find itself unable to preserve its liberties and treasures. It would be a badly managed bank which would get on without night watchmen to guard its stockholders' investments. The night watchmen (and day watchmen, too) of every progressive nation in the modern world must be its air forces. This country's aviation is far from what it should be and naval aviation is not that part of it which has felt the hard times least.

But in the circumstances the Naval Bureau of Aeronautics has made a very creditable showing, thanks to its general spirit and Admiral Moffett's patriotic efficiency.

The fiscal year 1932 was one of rigid economies which, of course, we hope will prove to have been wise. Savings in naval aeronautics amounted to $3,541,103, eleven per cent of the year's appropriations. The lessened expenditure for gasoline and oil, which were available at abnormally low costs, was about the only detail of this savings which did not react in actual decrease of defense power for the nation, for, as Washington knows, there had been a minimum of waste in the Naval Bureau of Aeronautics under Admiral Moffett.

Reduction of operating force by fifty per cent, a startling cash economy, has been one of those things that for a moment we may get away with, but it would be taking a perilous chance.

Economies can be ridiculously forced in such vital matters as the national defense. The airship *Los Angeles,* her operation unprovided for in 1933 appropriations, has been out of commission since June 30, 1932. Although she has seen eight years of actual operation, all valuable in training and experiment, she is still airworthy and is kept ready for recommission within thirty days. Training in lighter-than-air, indeed, has been discontinued, with personnel preparations for the *Macon* being arranged for as well as possible on the *Akron.* No allowance is made for normal losses through resignations, retirements, deaths and the return of men to sea-duty. So there is lighter-than-air, not wrecked but bitterly suffering through economies.

Heavier-than-air fares similarly. Training has been reduced, students are accepted only in such numbers as are necessary to care for attrition. Present fairly sufficient personnel is due to past training, while for the future no personnel is being trained. A year's training is necessary. Therefore we are not providing for a national emergency, either in heavier- or lighter-than-air.

But we have been making progress, thanks to the devotion of our men, from Admiral Moffett, Chief of the Bureau, right down the line. The *Akron* was commissioned October 27, 1931, and the fact that she was damaged during ground handling brought about improvement in mechanical handling gear, so strengthening it as to prevent a repetition of this accident to her or any other airship. For eight months she averaged over a hundred flight hours per month, during which progress was made in arrangements for handling planes on her.

The Bureau of Aeronautics has had to squeeze its pennies, but it has made them work. Production of helium has been increased and cheapened, a program of outlying mooring-masts permitting extended work with the big ships is under way. Exclusive of balloons, 554 flights kept our lighter-than-air 2,633 hours aloft during the year. Such a "hard times" record for the Navy's lighter-than-air nobody will beat at like expense.

With heavier-than-air the Navy did as well. The 918 service planes of the Navy and Marine Corps and the Naval Reserve's 162 were usefully busy, 588 service planes being with the active fleet, and 79 with the Marine Corps; 203 were used for training and only 48 for administration and experiment.

Progress included the development and service of faster scouting planes and faster fighters; the use of long-distance patrol planes based on tenders and the two fleet air bases (Coco Solo and Pearl Harbor) and increased operations by catapult-launched planes from cruisers and battleships. Nine new experimental planes were ordered and such modifications as experiment showed to be desirable were made in six previously-built experimental planes.

Acceptance tests at Anacostia were severe and effective, resulting in improvements and economies in building and maintenance. Naval specifications for engines now include 150-hour endurance tests; power output has been increased 10 per cent with the same piston displacement; the two-row radial air-cooled engine is here; high-speed airplane development progresses though small appropriations (only $220,000) hamper it pitifully.

Patrol squadrons have been busy, Marine squadrons operated afloat for the first time as units, the cold weather tests conducted by the *U. S. S. Langley* off New England were valuable, permitting decrease by half in weight of winter flying suits. Experiments with radio equipment, with non-corrosive steel, with carrier landings, with turntable powder catapults for battleship decks, with handling and towing of seaplanes, brought the adoption of several definite advances.

We need all this, and more, activity. The aircraft carriers *Saratoga* and *Lexington,* the experimental *Langley,* and the *Ranger* now building, will leave 55,200 tons to be built in the carrier class before we reach the position of 3.9 to Britain's 5 and Japan's 3, although our treaty rights permit us equality with Britain. Not even the building of flying decks on 25 per cent of allowed cruiser tonnage, however, would overcome our inferiority during the life of the Treaty, which expires December 31st, 1936. But while the building of eight 10,000-ton flying-deck cruisers instead of 8 ordinary six-inch gun cruisers would cost the Navy 24 six-inch guns, 160 airplanes would be gained for the fleet plus 8 highly-mobile landing fields, so recommendations to this end have been made.

Taken all in all a rather fine record of achievements and

(*Continued on page* 64)

U. S. NAVY FIGHTING AIRPLANES

Major General James E. Fechet, U. S. Army (Ret.)

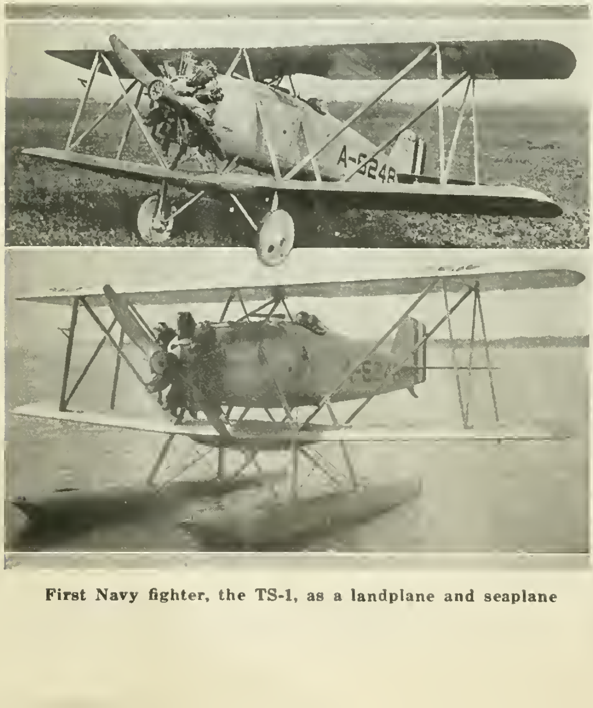
IN no type of airplane in use in the U. S. Navy does the pilot need to be so "sufficient unto himself," or even more accurate would be the term "efficient unto himself," as in the fighter. In addition to the job of piloting his fast and highly maneuverable plane, the fighting plane pilot must be able to fire his guns, drop his bombs, navigate, watch for enemy planes, search for and recognize his objectives and send and receive radio messages; all this he must do alone.

The conversion of the collier *Jupiter* in 1921 to the aircraft carrier *Langley* allowed the Navy to shift from floats to wheels and to operate its squadrons at sea. It also allowed the Navy to become seriously interested in the fighter, a type much needed in its organization.

The need for a plane possessing the characteristics of a fighter had long been apparent, but operating as the Navy did before the advent of the carrier, from shore bases—with the exception of those comparatively few planes based aboard battleships and cruisers—it was necessary that the plane combine the fighter characteristics with long-range capability. This was not a logical development. Hence it was not until the introduction of a landing field at sea that the use of fighting landplanes in the Navy became possible and practical.

The first Navy fighter was the TS-1 (1922-23), which had been developed for experiments in both landplane and seaplane conditions to determine its value to the service as either a carrier-based or catapult-operated plane.

The TS was designed in the Bureau of Aeronautics and built by the Naval Aircraft Factory and the Curtiss Aeroplane Co. It was designed to give the smallest and most compact plane with the maximum facilities for take-down and erection aboard ship. All wires and turnbuckles in the wing bracing were eliminated to facilitate rapid erection. It was powered with an air-cooled Wright J-1 rated at 200 horsepower. It had tankage for 2½ hours and could keep in the air at reduced speed more than 3½ hours. Its weight, fully loaded, was about 2,000 pounds.



First Navy fighter, the TS-1, as a landplane and seaplane

Back of the development of the TS-1 were the knowledge gained by personnel of the United States military services in connection with the wartime Spads, Nieuports, Sopwiths and SE-5's, all of European origin, and the development work which the U. S. Army had carried out in their MB-3 and PW series of pursuit planes. In the development of fighting planes the contributions resulting from racing should not be overlooked. From the purely racing planes turned out by various manufacturers valuable information was gleaned and the results were incorporated in service types. The development of maneuverability, as well as refinements in design, went ahead rapidly, and speed was stepped up from the 120 m.p.h. of the TS-1 to 245.7 m.p.h. of the R3C-2 Curtiss racer of 1925.

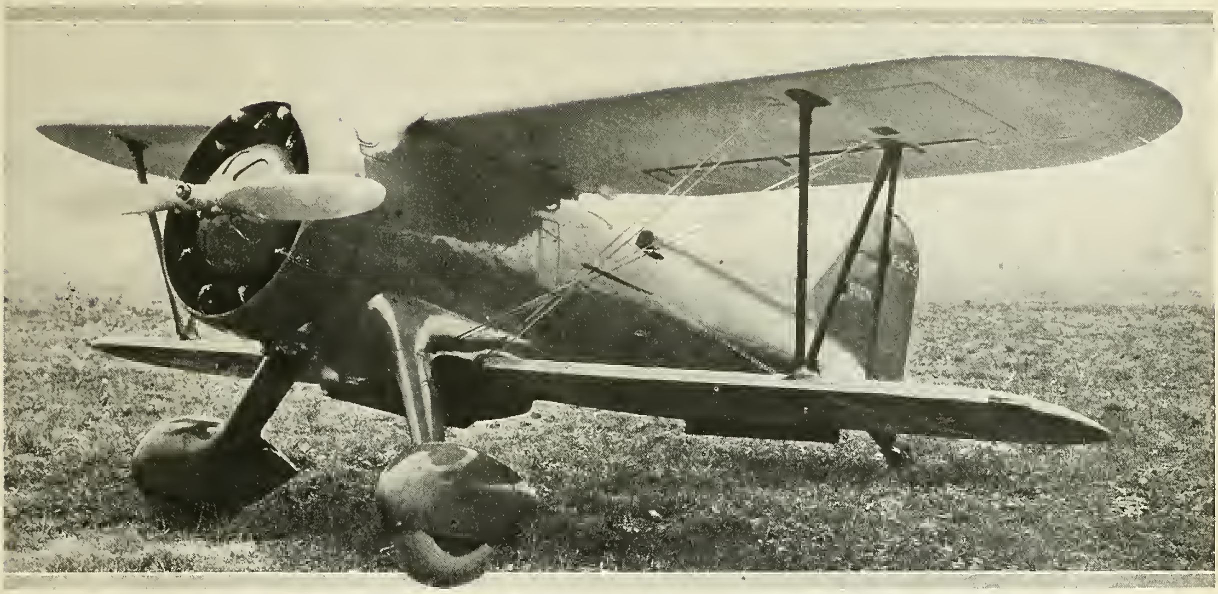
Following the TS-1 came the convertible (land and sea) Curtiss Hawks, and then a series of Curtiss and Boeing planes using the air-cooled engine, which engine the Navy had fostered in this country.

As a result of the experimental work which had been carried out on the *U. S. S. Langley,* and looking forward to the completion of the *Saratoga* and *Lexington,* the Navy Department was enabled to issue a definite statement of specifications for carrier fighters in 1926 which set forth the additional requirements of accepted types for carrier operations.

The Navy fighter follows the conventional military fighting plane design, but due to the unusual hazards encountered in continued operation over water and from carrier decks, certain additional features are necessary.

These additional features mean the strengthening of the airplanes to withstand the shocks of carrier landings, which in turn means added weight in the plane's structure. For operations over the sea, away from the carrier, it is necessary that additional gasoline be carried to insure a safe return to the floating field, which in turn means additional tankage. The fact that the plane's efficiency is somewhat reduced by the incorporation of the many features necessary for carrier operations is offset by the outstanding performances and value of the squadrons as a part of the Naval aeronautic organization.

Precautions are taken to safeguard the lives of personnel in the event of a forced landing at sea. To provide buoyancy in a forced landing on the water, rubberized bags built into the wings may be inflated with compressed gas almost instantaneously. Also, a rubber boat is carried in each plane, which further insures safety of personnel. That these measures are justified has been demonstrated many times; they have saved material and life in the Naval service, and their development goes hand in hand with the development of the planes themselves.



One of the four Curtiss "Sparrow-Hawks" or Navy F9C-2 fighters carried aboard the airship "U.S.S. Akron"

The Navy fighter had developed only gradually until 1929, due to the many unusual needs of the Navy, when the Boeing F4B-1 made its appearance. This plane, designed around the air-cooled engine, now holds first place in numbers in the fighting squadrons of the Navy.

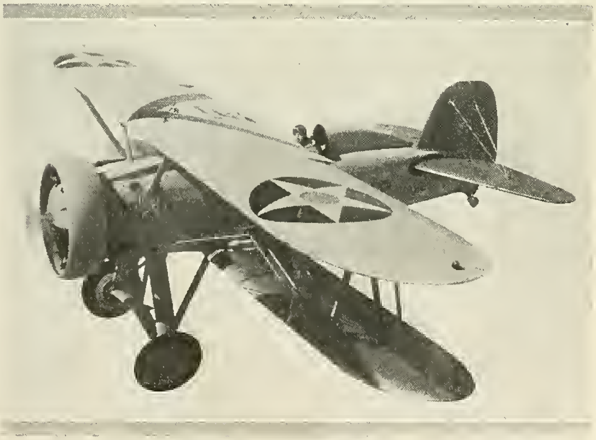
The F4B corresponds closely to the layman's idea as to how a single-seater fighter should look, with its short upper wing and its close-coupled "humpbacked" fuselage. The sweepback in the wings of the plane was eliminated, thus making the leading edges of the two wings parallel. The F4B and the new Curtiss fighter, the F11C, are capable of speeds approching the 200-mile mark at altitudes above 10,000 feet and have a ceiling of 25,000 feet.

On July 1, 1932, there were on hand in the U. S. Navy and Marine Corps 131 service fighting planes, 8 experimental fighters and 44 additional, which were classified as obsolete, and there were 69 fighters on order, of which 9 were experimental. Thus the fighting type in the Navy is second only in numbers to the observation and scouting types.

With the development of Naval aviation the mission of the fighter has been broadened to include bombing. The principle of fixed gunnery, that it is easier to "aim" a maneuverable airplane than to point a flexible gun, has been applied to bombing with fighting planes. The plane approaches its target in a nearly vertical dive at tremendous speed and releases the bomb when its sights are "on," using its high speed to retire beyond gun range of the target vessel. This method of attack is appropriately called "dive bombing" and is more efficient in driving home a surprise attack than the horizontal bombing method used by slow, heavy bombers.

The fighting plane is employed in several roles in fleet operation. As a pure fighter it may be sent out to engage and destroy enemy aircraft in a definite sector or locality; it may be used to escort spotting planes to their station and protect them while they are engaged in their important task of controlling battleship gunfire; it may be used as a protective convoy to accompany heavy bombers to their objective, fighting off any enemy air opposition encountered en route; or it may be used as a protective patrol in a sector, or in the vicinity of a ship or fleet, to guard it against attack from the air. As a dive bomber the fighter may be used to carry bombs against a definite objective such as an enemy carrier, or it may carry several smaller bombs for use against light forces.

With the exception of one small unit, the fighting plane strength of the Navy is concentrated on the three carriers, *Saratoga, Lexington* and *Langley.* This exception is the heavier-than-air unit attached to the *U. S. S. Akron.* Four small fighters are carried in a hangar inside the airship and may be launched or taken aboard at will. The F9C, the airship fighter, is the smallest practical airplane that could be built around the 420-horsepower Wright engine and is the first gull wing plane in the Navy. In spite of its small size, the F9C is a versatile airplane, capable of operating from the ground, a carrier deck or its own lighter-than-air base.



Boeing fighter F4B-4 used on Navy aircraft carriers

EDITORIALS

"It is apparent that the transporting of automobile parts by airplane may become the usual method of handling rush shipments in the near future."—**J. L. Kenyon, Vice President and General Manager, Chrysler Motors Parts Corp.**

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The Battle of the Railroads

PRECEDED by the struggles of the stagecoach against the steam locomotive, the windjammer against the steamship, the horse against the automobile, the battle of the railroads against air transport has begun. If any final proof had been necessary that air transport is upon the very edge of domination, this would supply it.

At this moment railroad lobbyists are seeking to deprive airlines of all subsidies, including bonuses to lines which carry passengers in mail planes. They are endeavoring to reduce or eliminate the use of Department of Commerce funds for aids to and encouragement of air navigation. All good signs. These endeavors to hamper aviation should run up aeronautical company securities on the exchanges and convince that public which still remains uncertain. Railroads are hard-boiled. It takes a heavy step to make them holler when it presses on their toes.

But they should not be ignored by the air industry, even though their desperate suggestions are obviously unsound in reasoning and though they propose policies calculated, if operative, to further disintegrate American business. As bamboozlers of the dumb though honest Congressman or Senator, they are as expert as a circus sideshow operator of the shell-game. We must steadfastly stand together and protect, against all misrepresentation, government support of civil and military aeronautics.

AERO DIGEST, being somewhat rough of neck and hard of heart, hating grade crossings, despising soft coal smoke and the mysterious disappearance of alleged values in the stock market as demonstrated by the skilful prestidigitators of the All-aboard-for-Ruin-Junction species, preferring free air to gaseous tunnels, will reply to railway anti-air talk by devoting its March issue to the information of the newcomers in House and Senate.

Our Washington Bureau will see to it that all Senators and Congressmen get copies of the magazine. It will show them why the "ail" is in railroads.

And now, becoming serious, we urge the active and immediate cooperation of every member of the industry in combating this hostile propaganda which is so definitely designed to do us and the nation harm.

Money given unearned to the railways, as they yearn to have it given, will do as much to bring relief to our economic agonies as would throwing it into the ocean. Railways have gobbled more of our prosperity than any other institution known to American history. They have had cash subsidies and land grants from both State and Federal governments; nearly all their units, at some date in their careers, have fattened on the public's money obtained for purposes of waste by skillful Wall Street shakedowns. If the railroads now are bankrupt, it is because they have been victims of both stupidity and crookedness.

Don't let them get away with it. If it comes to educating Congress, let us start a class entirely our own.

An Achievement

GENERAL FOULOIS' brilliant and convincing exposition before a House sub-committee of the work done by the Air Corps, and its grim necessity, was so effective that it impressed Congress with the importance of his vitally essential organization. This should be appreciatively noted by all who in any way are interested in American aeronautics. This work was so effective that the sub-committee gave the Air Corps in this worst year in recent financial history over two million dollars more than it had last year!

That was due to an exposition of a complicated case so thorough that the fair mind, hearing it, inexpert in aeronautical technique though it might be, inevitably must understand him and realize the need of preventing any further backslips.

The situation does not mean that the Air Corps is being favored when all other government activities are being cut; it does not mean that it has been given as much as it should have; but it does mean that General Foulois, with admirable ability, managed under difficult circumstances to get enough from Congress to enable the Air Corps to carry on without serious deterioration. That was a real achievement.

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"Airlines of the United States carry more passengers, mail, express, and fly more miles than all the airlines of the rest of the world combined. The fastest airlines operating in foreign countries today are using airplanes and engines built in American factories."—**Thomas A. Morgan, President of Curtiss-Wright Corp. and North American Aviation Corp.**

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Beware

BE satisfied to let the other chap have some of the business. "Avaricious" sometimes is spelled "p-i-g," and pigs are not noteworthy for intellect. Monopolies apparently may succeed for a while in the United States. When income has been good, chiefs of one company may endeavor, by securing large stock interests in rival organizations, at least to *restrain competition.*

But it works far less gloriously than it used to. The Federal Trade Commission has authority to investigate stock holdings and find out to whom they REALLY belong. It also can look into earnings and the sources whence they come, either at the request of Congress or on complaint of any competing company.

Ambition to control more than we ought to is present in the souls of most of us, but for continuous success nowadays it is well to temper such ambition with good judgment.

Senator Nye of North Dakota has introduced a resolution calling for an immediate investigation of aviation's business aspects. It will do no phase of our not-too-firmly-developed air transport facilities any good to have newspapers choked with reports of such probings by the Federal Trade Commission.

The warning is plain and should be heeded.

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"How fortunate we are to be engaged in work in a field which, in reality, is still in its infancy, since we have before us almost unbelievable avenues of advance in its development."—**Rear Admiral W. A. Moffett, Chief of Bureau of Aeronautics, Navy Department.**

Grand National Air Racing Circuit

by Caldwell

WHEN I was a boy, I yearned for a better understanding of the facts of existence. So each week I went to Waldron's Casino in Boston, a seat of higher learning, and there took aboard the weekly jolt of culture as purveyed by the Columbia Wheel Burlesque Circuit. This in large part accounts for the man I am today. But that isn't the point. The point is that each week I saw a new show. If I hadn't seen a new show, I wouldn't have gone so frequently and enthusiastically.

Those in the show business had discovered, away back in 1908, that people won't continue paying their money to see the same old bag of tricks over and over again. In aviation we haven't learned that yet. We cling to the delusion that the people of Cleveland or some other city will donate to pilots and manufacturers, year after year, any amount up to $100,000 for the privilege of watching a flock of brave young men rounding pylons. In addition to this donation, there is the production cost, which may amount to $150,000 more. So here we sit in 1933, hoping that the public of one city will pay a quarter of a million dollars to see races and stunts that they've seen many times before.

Well, they won't do it. They haven't the money, and I doubt that they have the desire.

All New York musical and dramatic shows that have been getting a $4.40 top have cut to $2.00 or $2.50 for the best seats in the house. The huge cinema cathedrals also have reduced prices. The 1933 Air Races also must cut admissions. If they run the show four or five days at half the price charged last year, it is possible that they will fill the stands every day. But otherwise it can't be done. But in that time and at that admission they are not going to collect, even with donated prizes, $70,000 in hard cash to hand over to pilots, as they did last year. The money isn't there. It is better to face these facts now than it is to start off with vague optimism and high prices, only to cut after the first day in the hope of luring enough people in to make it seem worth while.

If enough money isn't coming from one city to encourage designers and pilots to build and fly racing airplanes, why not develop a racing circuit playing several cities that among them may contribute that amount? So far as the public is concerned, an Air Race is simply a show. One city sees it, tires of it. But it would be new in another city. Then why not move it? Those old burlesque shows traveled from coast to coast, playing fifty different cities in fifty weeks.

The crowd was wild with excitement during the stock commercial plane races last year.

With an air show we don't have to play many cities in order to take in enough to distribute more prize money to pilots than we shall be able to do this year under our present system. Five cities will do to start with. We already have the show, scattered around the country in the form of airplanes and pilots. It will be brought together for the National Air Races on Labor Day. Why not bring it together before that time?

Start off in New York around Decoration Day and play three or four days. Then the boys win their prize money, go about their business, and play the next show in Philadelphia, Independence Day. Then around the end of July the show plays Boston, goes to Chicago for the early part of August, to Minneapolis and St. Paul for the latter part of August, ending Labor Day with the National Air Races at Cleveland.

We may as well understand this: The public will not continue to pay large sums of money to watch commercial planes race; they pay only to see fast stuff, built especially for racing. They crowd the stands to see the Thompson Trophy, or the races for fast little ships, but during commercial plane races they doze off. We must give them races with fast and ever faster planes to keep up interest.

The vast majority of the audience wants speed and stunts. We have the speed factor in the numerous racing planes around the country; we have the stunts right here in our commercial stunt pilots, without sending to Europe for them. Make the prize money attractive, and the racing pilots will enter every meet in the cities suggested. Then hire a good stunt team and have them do their stuff at all of the meets.

We shall have to develop about three classes of racers, of which we already have a working nucleus. Say we divide the classifications into 510, 720 and 1000 cu. in., with a free-for-all above that. During each day of a three- or four-day meet, we have one race for each classification. In a four-day meet each of our racing teams may have raced four times, with four chances at prize money. In the proposed circuit for 1933, the racing pilots may compete in twenty-four big time races. In these

(*Continued on page* 64)

PERSON.AIR.LITIES

BY

Cy Caldwell

ANYONE WHO HAS visited Miami, where wild women become wilder and even tame ones appear interesting, must know Andrew H. Heermance, Director of Aviation for that delightful city, and hence one of the big shots of those parts. However, like all the great men of our time, there have been periods in his life when he wasn't a big shot; when he was, as you might say, nothing but a pellet pattering ineffectually against the world's fortress and making practically no impression upon it. And it was during one of those 22-caliber periods of his career that I first met Andy, when his sole means of support appeared to be his back, on which he was reclining beneath the wing of a Jenny. He seemed to have some connection with the ancient craft under which he was resting, but as I never saw him urge it into the air, or even wipe it off, I naturally asked him what he was doing for a living.

Andy Heermance

"Well," he yawned, "I'm supposed to fly this thing occasionally. I take it up every now and then, or even at more infrequent intervals. Mostly I just sort of sit here. Miami is a very pleasant place to sit."

It is indeed. In fact, I don't know of a finer place to sit than in Miami. This was years ago when I was slowly herding a Fairchild FC2 on floats in the general direction of Haiti, which at that time was cowering in the path of an advancing hurricane that hadn't decided whether to obliterate Haiti or pass it up. So meanwhile I waited at Miami, resting. And I want to express my appreciation of Andy Heermance as a resting assistant. What he may be as a business man, as a Director of Aviation for a great metropolis, I don't know. But as an assistant loafer he hasn't an equal.

In all the loafing I have done (and I've taken post-graduate courses in plain and fancy loafing) Andy looms through the years as the Prince of Recliners. We rested under that Jenny, we leaned back and slept in his car, we dozed on the sands by the restful waves. Sometimes we spoke; infrequently we passed some observation on this or on that; but mostly we just rested, basking in that delightful Florida sunshine and an utter absence of labor, care, trouble or strife. No wonder Ponce de Leon hunted for the fountain of youth in Florida, because that's where it must be. You don't even have to look for it. By looking for it you will miss it. Just sit, and it comes to you. Talk about youth! I had grown right back to my second childhood when the hurricane moved away from Haiti and I had to shoulder the white man's burden and trundle that Fairchild down to the land of the blacks.

Probably the only trouble with being Director of Aviation for Miami is that Andy had to crawl out from under that Jenny and do things. It must have been rather painful for him at first. It was about two years after my first visit that I returned to Miami and saw Andy getting started: he had come out from under the wing and was standing in front of the machine. He was muttering something about great developments that were in progress, but naturally I thought he was only talking in his sleep. Then reports began to reach me about Andy doing this and that, which of course I didn't believe, until he wrote me on City of Miami stationery with his name printed on it as Director of Aviation. Then I knew that the worst had happened—he had gone to work. I fear this has cut into his rest periods and ruined his life.

Andy was born at Rhinebeck, N. Y., March 12, 1895, attended Riverview Military Academy and Williams College, and learned to fly in 1916 at Newport News, Va., at the old Atlantic Coast Aeronautical Station under the management of Capt. Thomas S. Baldwin. He got his first license on boats Dec. 1, 1916 (FAI No. 672), and later changed over to landplanes and instructed at Newport News until he enlisted as a private in the Air Service at Langley Field. He was scheduled to go across and come to grips with the enemy but was stopped at the gangplank and shipped out to Kelly Field to instruct instructors. Then a shortage of test pilots (who were regarded as expendable material in those days) reminded the Army that they might as well transfer Andy to the test hangar for the duration of the war. It was a restful hangar.

So there he sat until it was all over. Occasionaly he took up a new machine, tested it, brought it back, watched them wheel it away, and again sat down. He was sitting there, under a D. H., when someone blew a whistle, notifying him that the war was finished and that America was now ready to lose the Peace Conference and the rest of its money. Andy returned to Newport News, opened a school, sat watching it awhile, and then moved to Miami where I found him under that Jenny. I believe he was Field Manager of the Miami Airport at that time, but it didn't show on him. I now suspect that he's one of those strong silent men we read about who never seem to be in a hurry to do anything—in spite of which everything gets done all right. After all, it isn't the vehicle that makes the most noise that travels the fastest. If it did, think at what a dizzy pace our dear old Ship of State would proceed!

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THE EARNEST-LOOKING officer snapped in the act of speaking into a microphone is not directing a squadron of bombers into correct bombing position over the heads of our Lame Duck Congress. He is not doing anything so useful and so patriotic. He is merely telling the crash-minded spectators at the 1932 National Air Races what a military formation is doing above them. For here, in all his charm, we have my very good friend Lieut. Roland Birnn, Information Officer, Air Corps, caught in the very act of performing his duty to the taxpayers. When he is not doing this he is sitting in the office of the Chief of Air Corps handling Press Relations or toiling at the "Air Corps News Letter." Lieutenant Birnn is one of the busiest and most hard-working officers in Washington, a city not especially noted for hard labor. In fact, anyone who works at all in Washington is outstanding and something of a curiosity.

Lieutenant Birnn was born in New

Lieutenant Roland Birnn

Jersey and rather early in life came under the civilizing influences of New York City. He entered the United States aboard the 42nd Street ferry, passed the immigration officers, who mistook him for an Icelander, and at once went to school in New York. If everyone from Jersey would do this, it would be a better world. But no matter. Birnn learned the language in New York and then went to work as a civil engineer on the tunnel under the East River that the Long Island Railroad was driving through the muck and rock to reach those unfortunates marooned in the wilds of Queens and Jamaica. However, Birnn never waited to complete the tunnel because he came up for air in 1917 to help Uncle Sam make a good-hearted booby of himself over in Europe. That was in the days when we were referred to as dear old Uncle Santa Claus, and not Uncle Shylock, which is our status today.

Well anyhow, this young Birnn trained at Princeton Ground School and then went to the flying school at Taylor Field, Alabama, on Standards with Hall-Scott motors and on Jennies. By the time he got through all this it was September, 1918, and he was too late for the war but just in time for the bonus, which is as good a way as any of timing warfare. He instructed other lads who were even later than he was, and after the war served as operations officer with the 94th Squadron of the First Pursuit Group; then with the Battleship Bombing Project at Langley Field, Va., in 1921. During that merry affair the boys used to fly sixty-five miles out to sea behind Liberty motors and drop bombs on battleships. By special permission of the Foreign Powers the lads were allowed to blow up the hull of our own partly completed battleship, the *Washington,* which was considered a diplomatic triumph for America. We have fooled the enemy in the next war by sinking our own ships first, something that never would have occurred to the French, who never sink anything more valuable than an American taxpayer, who is half sunk already.

Lieutenant Birnn then served three years in Panama and explored much of the jungle and mountain country from the air and on foot. He didn't see Sandino anywhere, and my theory is that Sandino eluded him, came to the States, and is now going under the assumed name of Walter Winchell.

The bounding Birnn returned to civilization, or to as much of it as can be found at Kelly Field, Texas, in 1924. Then he was with the 5th Observation Squadron at Mitchel Field, which, to quote his own peculiar accent, is "out on Lonk Island, where I was flyink and prayink and tearink my hair." You see, Birnnsy's ancestors came from Iceland, where they got an overdose of vitamins from the cod liver oil of those parts. I had him on the air for a radio interview recently, and someone called up the studio to know if that was General Ma or Hitler with me. He's a great old lad and for him the world is full of friends. His kindly helpfulness to the newshawks and magazine writers on that great aerial armada of 672 airplanes touring the country in May, 1931, made many friends for him and the Army Air Corps.

* * *

WE'VE been having a little difficulty with our Hands Across the Sea stuff. It hasn't been going so well. For example, we had Hands Across the Sea with France. They were our old pals. Didn't they send Lafayette over here? It was more to annoy the English than to help us—but they sent him, at least. Then in the war we stretched our Hands Across the Sea, and even sent off a lot of the boys to help in the tribal squabble over there. The French loved us for that—until it came time for them to pay back some of the money. Then we became just guys they owed. No wonder their love for us cooled. They hated us so that they just up and stopped paying—

Right now there are exactly four Frenchmen who are popular over here: Lafayette, Premier Herriot, Maurice Chevalier and Major Georges Thenault, Air Attaché of the French Embassy in Washington.

Now Lafayette has been dead for some time, Chevalier seems to be dying, more or less, cinematographically; Premier Herriot was kicked out by his own people when he advocated paying a little of what France owed us, and Major Thenault has been recalled to France to serve with the troops. That leaves exactly no Frenchmen here on whom we can lavish our affections.

This is a plea to the French Government (which undoubtedly reads AERO DIGEST in order to keep up with the times) to send Major Thenault back to Washington as Air Attaché the first moment they can conveniently spare him. All of the air and diplomatic people in Washington liked and admired Major Thenault so much during his stay there, that they have practically forgiven all the other Frenchmen for being Frenchmen. When a country can send us a man who can work a miracle like that, they should do their best to leave him with us permanently. In fact, the way the diplomatic lads in Washington feel about it, if France will just send Thenault back, they needn't bother about the rest of that debt.

You know, Major Thenault was Assistant Military Attaché for years before he became Air Attaché. He's been there long enough to be at home in the United States and to know everyone in Washington. He married an American girl, too—the former Miss Sarah Spencer, of Chicago. They have two children who grew up with the country, until the Hoover Era definitely stunted its growth.

Major Georges Thenault

In the war Major Thenault commanded the famous Lafayette Escadrille during its two years of existence, having had the more famed Americans Lufberry, Norman Prince, Rockwell and Chapman under his command. He has been a pilot since 1913, having soloed in August of that year in an old Caudron. He still keeps up with his flying. He imported a Morane monoplane some years ago, kept it at Bolling Field and made numerous flights all over the country. Do you remember two years ago when the weather was so bad that nearly everyone en route to the Air Meet at Miami sat down some place? For two weeks the weather was terrible; it took five days to get there and ten to get back. Some of them are still there. Well, Major Thenault, flying his Loiré seaplane, left his mechanic behind and flew through alone. This boldness isn't recommended as a general practice, but it shows the stuff the old Escadrille leader has in him.

It is Major Thenault who for years has represented the French government at American Legion conventions and other events requiring the presence of a dignitary in military uniform. He has uniforms for all occasions, white ones, blue ones, gold ones, with enough medals to cover the front of all of them. He earned the medals, too, which is a surprising thing in itself for any officer attached to the diplomatic service, who usually got his medals along with the rations.

Major Thenault's many friends in the aviation industry wish him all good fortune on his tour of duty in France and hope that he will be sent back to them a Colonel, no less.

NEWS OF THE SCHOOLS

Casey Jones School Adds to Facilities

IN ORDER to accommodate increasing enrolments, the Casey Jones School of Aeronautics at Newark, N. J., has doubled its floor space from 5,000 to 10,000 square feet. The addition of space provides a new lecture room, separate advanced and elementary engine departments, a welding shop and a drafting room for design and engineering classes.

The faculty has been augmented by Donald Walling, formerly associated with Pan American Airways and Curtiss-Wright, in charge of advanced engine instruction, and Thomas Schultz, formerly with Curtiss-Wright and operator of his own school, in charge of the welding school.

Additional machinery has been installed in the airplane shop. The engine laboratory has added a Curtiss Conqueror, Curtiss C-6, Warner and Cirrus engines to its equipment, making a total of fourteen different types of engines.

The school reports an enrolment of more than forty students, of which twenty-nine are taking the master mechanics' course.

Spartan Offers New Course

A NEW master mechanic's flying course has been added to the Spartan School of Aeronautics courses. In addition to the regular master mechanic's course, this will include ten hours of flying on the Spartan C-2 trainer. The combination of the two courses requires five months to complete. It also is offered at the Oklahoma Military Academy through its affiliation with the Spartan School of Aeronautics.

Brooklyn School Approved

A. C. BUSSY, president of United Air Services, Floyd Bennett Field, Brooklyn, N. Y., has announced that his school has been approved by the Department of Commerce as a school for private pilots' training.

Ground School Second Term to Open

SECOND TERM of the University of Oklahoma ground school extension course will start February 2 in the Oklahoma City Y. W. C. A. building, under direction of Capt. Bill Bleakley. Two classes will be held, one for beginners and the other for second-year students and pilots who want to improve in navigation. The extension course was started in the fall.

Eleventh Boeing Class Graduated

COMMENCEMENT EXERCISES for the eleventh graduating class of the Boeing School of Aeronautics were held recently. Nine students were graduated. Guest speaker for the occasion was Dr. Hamilton Jeffers, assistant astronomer at the Lick Observatory on Mount Hamilton, near San Jose, Calif. Dr. Jeffers, a flier himself, also is a student at the Boeing School, spending his vacations taking flight instruction. He hopes to exchange his private pilot license for a limited commercial license soon.

Pratt Offers Aeronautical Course

PRATT INSTITUTE, Brooklyn, N. Y., is giving a course in airplane performance and design during the semester starting January 30. Taught by Richard Knowles, former assistant in the Guggenhem Laboratories at New York University, classes will study principles of airplane flight and calculations of performance, including ceiling, high speed and climb; wind tunnel tests and their interpretation, details of design characteristics of modern planes and power plant installation.

The institute also holds day and evening classes in aerodynamics.

Harvard to Give Photography Course

THE FIRST COURSE in aerial photography ever given at Harvard University will be offered during the second half of the present college year, it was announced last month by Prof. A. H. Rice of the Harvard School of Geographical Exploration. Known as Geography 36, the course will be given by four officers in the Army Air Service on special leave from Wright Field. They are Capt. A. W. Stevens, Capt. D. M. Reeves, Capt. B. C. Hill and Lieut. J. F. Phillips.

Captain Stevens is one of the pioneers in aerial photography, having been in the Army Air Service for over fifteen years. In 1924 and 1925, he accompanied Dr. Rice on an expedition in Brazil in which aerial photography was employed with success to chart remote sections of the interior. Captain Reeves has recently published a book on aerial photography and aerial exploration.

The course, emphasizing aerial photography and surveying as an aid to modern exploration, will be held on Tuesday and Thursday afternoons and will be open to qualified graduate and undergraduate students. The latest photographic equipment, including a five-lens camera, is being provided for use in connection with the course, and plans also are being considered for actual aerial work by students towards the close of the course.

Arrangements are being made for a series of free public lectures by the Army Air officers, probably in February and March, dealing with military photography and aerial exploration.

Bennett Griffin Forms Air School

A CHARTER has been granted to Bennett Griffin Flying, Inc. Capitalized at $25,000, the new corporation was formed by Bennett Griffin, trans-Atlantic flier; his manager in the flight to Berlin, Clarence Page, and C. E. Newman. It is their plan to buy at least two training planes, to be used by Griffin in courses of instruction, and another plane for cross-country work. The firm will operate from the Oklahoma City, Okla., municipal airport.

Roosevelt Students Fly to Miami

TWO STUDENTS of Roosevelt Aviation School, Mineola, Long Island, N. Y., accompanied by two experienced pilots, made a cross-country training flight to the air races at Miami, Fla., last month. A similar flight to Miami, in which five students will participate, is being planned and will probably take place this month.

On the flight last month Charles May and David Wehman were the students, who were accompanied by R. J. Barbin, assistant operations manager at Roosevelt Field, and Hugh Copeland, director of the ground school division. They left Roosevelt Field on Wednesday, January 4, stopping overnight in Richmond, Va. The second night was spent at Jacksonville, Fla., and Miami was reached the following day. After remaining at Miami until Monday, January 9, the group returned by easy stages to Roosevelt Field, arriving at their destination January 11.

Tulsa School Changes Hands

E. A. FIELD, former president of the Aero Corp. of Oklahoma at Tulsa, has purchased the assets of the company, whose school and other business, with the exception of the distributorship of Great Lakes airplanes, will be carried on under the name of the Field Flying Service. The firm, in addition to operating the school, has an aerial taxi service, engages in aircraft brokerage and aerial advertising and is distributor for Aeronca airplanes.

Evening Instruction for Fliers

NIGHT SCHOOL INSTRUCTION for aviators is given in the Hargrove Air Service headquarters at the San Francisco Bay Airdrome, Alameda, Calif. Every Friday evening Virgil Simmons, Hargrove air school instructor, will deliver lectures in a new ground school course designed to give holders of private pilot's licenses a better understanding of meteorology, map-reading and the most modern technique in flying.

The course will be based on the Thorpe method of ground work.

Maine Ground Course Offered

A GROUND COURSE covering all phases of flying is being conducted at Portland, Me., by the Portland Flying Service, Inc. The complete course will include twenty-four semi-weekly lectures.

Boeing Scholarship Committee Named

MEMBERS of the National Committee of Award for the 1933 W. E. Boeing Scholarships have been chosen as follows: Dean Baldwin M. Woods, head of the mechanical engineering department of the University of California, chairman; William B. Stout, of the Stout Engineering Laboratories, Detroit, Mich., and K. A. Kennedy, general traffic manager for United Air Lines. The essay contest for the four scholarships is open to university and college students in the United States and Canada.

Ryan Students Have Formation Practice

ADVANCED FLIGHT STUDENTS at the Ryan School of Aeronautics have been flying in five-ship formation practice under the direction of John Fornasero, Ryan chief instructor. Training is limited to transport students. All Ryan formation flight practice is given in Great Lakes planes powered with Cirrus air-cooled engines.

Dallas School Increases Facilities

THE DALLAS AVIATION SCHOOL, located at Love Field, Dallas, Tex., has added Hangar No. 5 to its properties and will increase the size of the school to four hangars, affording it more than 50,000 square feet of floor space. Hangar No. 5 will be used for storage and school activities.

This school has received Govermental approval of the aircraft service and repair station maintained in connection with its training activities. Maj. William Long is president of the company.

Idaho Club Starts Enrolment Plan

THE Pocatello (Ida.) Flying Club, under the sponsorship of Ralph Knapp of that city, has put into effect an enrolment agreement under which any student desiring instruction in flying may enroll for an advance fee. Instruction is given at an hourly rate.

Houston Aviation School Started

T. A. McCARTY, formerly manager of the Aeronca Flying Service in Houston, Tex., and president of the Houston Flying Club, has opened a flying school at the Houston Airport. Equipment includes a Waco F plane.

Aerial Photography at Boeing School

IN ORDER that students in the course of aerial surveying may become familiar with modern methods of aerial photography, the Boeing School of Aeronautics, Oakland, Calif., has completed its own photographic laboratory and dark room. Each student is required to make a series of vertical photographs which he must match in scale value and assemble into a mosaic or photographic map, showing details impossible to obtain in ordinary surface surveys. He also takes several oblique views which cover the area between the plane and the horizon.

Robert Macy has been appointed as sales representative for the school in southern California, with headquarters in Los Angeles.

Air Transportation Now Demands New Training

By **GEORGE E. BOUNDS**
Parks Air College

AVIATION instruction must be designed to meet a definite need. The progress which has taken place during the past few years has rendered many former methods of training obsolete, and therefore the pilot who was trained two or three years ago may not be qualified to meet the requirements of present-day operators.

Experience has proved that the present-day pilot must qualify himself not only as a competent operator in the air, but he must spend the time necessary to develop himself technically and give serious thought to administrative work.

Parks Air College has found through a survey among its own graduates and those graduating from other schools that the men most in demand in this industry are those who know how to fly, can demonstrate more than the ordinary amount of executive ability, and who also have a keen knowledge of mechanics. Three years ago a man could qualify for a transport rating within six months' time and without any difficulty make a suitable connection. During these times we were led to believe aviation would reach its ultimate accomplishment when masses of our people would take to flying their own airplanes as a means of transportation. This activity did not grow on a large scale. It was supplanted by a means of transportation gigantic in its proportion—changing the picture entirely and creating a demand for highly skilled manpower.

The man with a transport license of three years ago found himself at a disadvantage, since the operators demanded not only flying ability but administrative knowledge. The pilots of the early day paid little attention to the development of character, appearance, personality, attitude toward life as reflected in his every-day actions. His deportment and in particular his school record meant little to him.

The picture has changed. The man who enters big league aviation today must realize there is more to aviation training than just sitting in a cockpit, handling the controls of the ship and following the advice of an instructor. Long hours of classroom work, nights of study, hard labor during the day, are a few of the important factors leading to the development of the pilot of the new day, whose aviation training requires approximately two years.

The growth of the air transportation phase of aviation has made it necessary for schools to stress the importance of administrative work, and to include such subjects as commercial law and finance, air transport operation, aeronautical bookkeeping and accounting, business English, advanced stages of navigation and meteorology, airplane designing, a complete analysis of electrical equipment as applied to the aircraft industry, and a comprehensive study of aircraft radio, advertising, sales promotion and salesmanship. A competent pilot should spend at least 7½ months in technical school before he is thoroughly qualified.

Training of this calibre classes the graduate pilot as a member of a skilled profession such as medicine and law. Many of these graduates do not draw the salaries of union skilled trades; therefore it seems that the cost involved and the time required in getting the necessary fundamentals are more nearly the things which set the profession apart from the trade. It takes a lawyer from three to four years after graduation from college to acquire enough experience before he is admitted to the bar and two years for a medical student to become a doctor. The executive pilot should be judged by these same standards. As far as I know there is not another profession requiring the long years of apprenticeship and as many years of school as a pilot is forced to go through before he has completed his full training.

The young men who are entering the industry today, many of them after one or two years of previous college education, are not the type to class themselves among the workers of the skilled trades. We maintain that the new type of pilot and executive in training today at several of the Government-approved schools deserves a berth among professionals. Whether it works that way in years to come will depend on the pilots themselves. If they organize and keep the standards high, as in the legal and medical professions, the desired effect will be accomplished.

The pilot of today must develop himself into the business man of tomorrow. If he is to be the executive of an air transportation enterprise, he must be a competent pilot to function successfully. If he holds a leader's place in the general structure of American Business, he must know aviation as a great element of the transportation industry.

. PRIVATE FLYING .

Eighty-seven Pilots Join in Cruise

THE SECOND ANNUAL FLORIDA WINTER CRUISE of the U. S. Amateur Air Pilots' Association was completed last month with a total entry list of eighty-seven. Twenty planes took off from the Aviation Country Club field at Hicksville, L. I., N. Y., on January 3. More were added at Washington, D. C., the first stop. Several others joined the fleet at Richmond, Va., followed by more along the entire route to Florida.

There were twenty-two entries in the first cruise conducted by the organization. An increase was anticipated this year, but it was not expected to assume such large proportions. The reason for it is attributed in great part to the introduction of the Florida Year-Round Clubs Handicap Race as an added feature. Henry L. Doherty, financier, inventor and president of the Florida Year-Round Clubs, posted the Henry L. Doherty Trophy and $2,500 in cash as the awards in the 240-mile cross-country race staged between Daytona Beach and Miami on the last leg of the cruise, which was won by J. Heron Crossman III, of Wilmington, N. C. Raoul Cote, Kankakee, Ill., finished second, and Edgar Woodhams, Manhasset, L. I., N. Y., was third.

Seattle Women Open Club Quarters

CLUB ROOMS were recently opened by the Seattle (Wash.) Chapter of the Women's Aeronautic Association in the administration building at Boeing Field. The club rooms between meetings will be at the disposal of passengers waiting for planes, those meeting planes, students and pilots.

Flying Around South America

L. B. MANNING, a director of American Airways, with headquarters in Chicago, left January 6 for an air trip around South America. He expects the trip to log 14,000 miles of actual flying. Accompanied by Mrs. Manning, he began the journey by train and boat to the Canal Zone, where the air trip will start

Boy Makes Long Solo Flight

GEORGE CLERISSE, 16-year-old flier, recently made a solo flight across the Rocky and Sierra Nevada mountains from Denver, Colo., to San Francisco, Calif., in a Travel Air.

Pilot Saves Drowning Boy

WILLIAM HOPKINS of Sussex, N. J., was credited with saving the life of one boy and attempting the rescue of three others last month when they broke through ice while skating on Lake Wildwood, N. J. Hopkins was flying over the lake when he saw four sons of Mrs. Eva C. Swayze struggling in the water. Making a dangerous landing on rough ground nearby, the pilot telephoned for aid, his call resulting in the rescue of one of the youths. Help came too late to save the others.

Youth, 18, Obtains Transport License

PAUL CLOUGH, 18, of Garden City, Long Island, N. Y., has received his transport pilot's license, the highest rating for pilots. He obtained his private license in 1930 and his limited commercial in 1931.

New Jersey Aeronautical Club Formed

TOWN ENGINEER CARL EVERTZ of Newton, N. J., was chosen president of the Sussex County Aviation Club at its organization meeting recently. Other officers include Miss Irva Scheren, secretary, and Frank J. Boglioli, Lester J. Sweeley and Lieut. Fred Johnson, members of the executive committee.

McAdoo Makes Transcontinental Flight

SENATOR-ELECT WILLIAM G. McADOO of California made a trip last month in his own airplane from Los Angeles to Washington, D. C. Accompanied by George Creel, San Francisco writer, and Thomas M. Storke, Santa Barbara newspaper publisher, he made the flight East in order to confer with President-elect Franklin D. Roosevelt and other Democratic leaders.

Wilkins to Join Antarctic Expedition

SIR HUBERT WILKINS, noted explorer, has announced that he will be a member next summer of the Ellsworth-Balchen Expedition that will attempt a round-trip flight across the Antarctic continent from the Ross Sea to the Wedell Sea. The plane chosen for the expedition is a Northrop Delta monoplane, described in the November, 1932, issue of AERO DIGEST. Sir Hubert will serve as correspondent for the group, sending back regular reports. Less than twenty men will be included in the expedition.

Riiser Larsen, Norwegian explorer, sailed from England last month with a group to lay ground work for the expedition.

American Returns After British Tour

RICHARD ROSENWALD, of Chicago, Ill., recently returned from an extended stay in England. Mr. Rosenwald used a plane almost exclusively in his travels about the British Isles, at times flying the plane used by the Prince of Wales. James Mollison, the flying Scotchman of trans-Atlantic flight fame, was his companion on several flights.

Florida Clubs Open Autogiro Service

AFTER a christening in Washington by Prof. Auguste Piccard, who made his first heavier-than-air flight in it, the newest autogiro and largest cabin ship of its type ever built was flown South last month to go into service as an air ferry among the units of the Florida Year-Round Clubs in Miami. The pilot of the autogiro is Roland Rohlfs, holder of the world's record for altitude in 1919. Henry L. Doherty, president of the Florida Year-Round Clubs, is owner of the ship.

In Miami the autogiro is to operate on a regular schedule, carrying Florida Year-Round Clubs members between the Miami Biltmore Country Club and the Roney Plaza Cabana Sun Club. It is planned to extend the service to the Key Largo Anglers' Club. A fleet of Aerocars running between the two clubs make the trip in about twenty-five minutes, the same distance being covered by autogiro in eight minutes or less.

Ohio College Organizes Glider Club

STUDENTS of Kent State College, Kent, Ohio, have formed a glider club under the sponsorship of Prof. E. Tischendorf of the manual training department and the student leadership of Roger Wolcott and Harold Law. The club plans to construct a two-place secondary glider, with a wing span of 40 feet and a fuselage 21 feet long. It is expected to operate the glider from the Akron airport, employing the auto tow method of take-off and climb, with a 1,500-foot cable.

Maine Group Holds Aviation Ball

THE SECOND ANNUAL AVIATION BALL was held January 13 by the Forest City Flying Club in the Hotel Eastland at Portland, Me.

Pembroke Women Form Flying Club

AN EXTRA-CURRICULAR FLYING CLASS has been organized by students of Pembroke College, Providence, R. I. Members plan to take a ground course and dual control instruction, later progressing to solo flights.

Birds Fed from the Air

FIVE HUNDRED POUNDS of grain were scattered from an airplane over about 100 square miles in northern New Jersey recently by Dr. D. P. Grootenberg, president of the Consolidated Sportsmen's Club. Acting with the cooperation of the Wright Aeronautical Corp., Dr. Grootenberg dropped the grain, contained in one-pound paper bags, for the benefit of game and song birds, which were having difficulty in finding food because of snow.

AT THE AIRPORTS

Airports Show Six-Month Gain

A TOTAL of 2,117 airports and landing fields were in existence in the United States on January 1, an increase of 80 since July 1, according to a recent report prepared by the Aeronautics Branch of the Department of Commerce. Of the airports on record January 1, 701 were fully or partially lighted for night use.

The airports were classified as follows: 549 municipal, 621 commercial, 352 intermediate, 476 auxiliary, 51 Army, 15 Navy and 53 miscellaneous Government, private and state airports and landing fields.

California led all other states in the number of airports and landing fields on January 1, having a total of 175, while Texas was second with 148. Pennsylvania, with 110, occupied third place. California also had the largest number of municipal airports, 53. Pennsylvania led in number of commercial airports with 66, and Alaska had the largest number of auxiliary fields, 68.

San Francisco Bay Airdrome Traffic

PASSENGER TRAFFIC figures for 1932 at San Francisco Bay Airdrome, Alameda, Calif., totaled 106,723, an increase of 38.8%, or 29,869 passengers, over 1931, according to Roy U. St. John, manager of the airdrome. Planes landing at or departing from the terminal also operated with a higher load factor in 1932 than in 1931.

Love Field Receives High Rating

THE AERONAUTICS BRANCH of the Department of Commerce has awarded Love Field, Dallas, Tex., the A. T. A. rating. Other fields with that rating are at Birmingham, Detroit, St. Louis and Cleveland. During the past year weather reporting facilities have been improved at Love Field, an extensive system of runways and a loading apron have been constructed and additions to the lighting system have been made.

Roosevelt Field Company Expands

BECAUSE OF an increase in business, Engine Air Service, which is located in Hangar E, Roosevelt Field, has leased the entire front shop space in the hangar to accommodate their new equipment. The company, which is owned and operated by Lawrence Hauft and Walter Burfoot, specializes in overhaul and repair of airplane engines.

Aviation Concession at World's Fair

ARRANGEMENTS with the Century of Progress have been concluded under the terms of which Pal-Waukee Airport, Inc., Chicago, Ill., has been granted the exclusive concession for operation of heavier-than-air aircraft, except autogiros, during the period of the World's Fair in that city next summer.

Due to limitations of space, it is reported that no landing field is practicable. However, the space provided for the concession is centrally located within the Fairgrounds and part may be used as a seaplane and amphibion base.

In addition to providing service facilities for visiting aircraft, shuttle planes to Chicago Municipal Airport will be operated at frequent intervals. A large activity of the concession will be that of sightseeing rides over the Fairground. If the Pal-Waukee management needs additional aircraft to handle the crowd of visitors, it is intended to permit individual operators of suitable aircraft to help carry passengers, on a percentage basis.

Construction plans are being drawn for the ramp and other necessary items. Actual construction of the ramp will not be begun until spring. One of the largest restaurants in the Fairgrounds will be located on the site of the concession. It is planned to surround this restaurant with a circular glassed-in porch where visitors can sit in comfort and watch the flying activities.

Kansas Field to Be Airmarked

COFFEYVILLE, KANS., AIRPORT is to be airmarked in the near future. Letters of the word "Coffeyville," made from white stone laid upon the ground, will be twenty-six feet long and will extend for a distance of about 500 feet. R. G. Parker of Denver, engineer and pilot, is in charge of the layout work.

High Rating Granted Wyoming Field

CHEYENNE (WYO.) MUNICIPAL AIRPORT, operating headquarters of United Air Lines' Boeing division between Chicago and the Pacific Coast, has been granted an A-1-A rating by the Department of Commerce following improvements on the field. All of United's coast-to-coast mail, passenger and express planes stop at this terminal, where planes and crews are changed on all schedules. In addition, the airport is the connecting point for air service to Denver, ninety-six miles south of Cheyenne.

Firm Opens Business at Memphis

THE AIR SERVICES, INC., was scheduled to begin business at the municipal airport at Memphis, Tenn., last month. The company will do commercial transporting and school work. A charter of incorporation has been filed, with B. W. Cohn, Memphis attorney, William R. Kent and Joseph A. Wright as the incorporators. The firm has as equipment three planes, two of which will be cabin jobs to be used for passenger service and one open ship for school work.

Oakland Airport Shows 1932 Gains

INCREASED BUSINESS during 1932 is revealed in the annual report of Oakland (Calif.) Municipal Airport. Total passengers for the year were 28,972, according to the Board of Port Commissioners, a substantial increase over 1931. The number of plane landings was 71,350, and transport planes totaled 6,451.

Rhode Island Airport Building Finished

MODERNISTIC and futuristic in design, the $25,000 administration building and passenger terminal at the Rhode Island State Airport in Hillsgrove has been practically completed. The structure was dedicated in October at the first annual New England Air Pageant.

The new building includes a waiting room, 22½ by 38 feet, with large plate glass windows running the length of the room on the field side; a built-in scale at the ticket counter for weighing in passengers and freight; telephone booths and telegraph facilities; four offices and men's and women's retiring rooms on the lower floor. On the upper floor is the control room, entirely glass-enclosed with the exception of its rear interior wall; a station for the U. S. Weather Bureau, and a pilots' room.

The building is so constructed that outside are four deck levels, each with railings, from which port officials can watch field maneuvers. All light and power wiring on the port and leading to the new building is underground. In the control room are switches for lights and signals, one of them controlling the 7,500,000-candlepower air beacon just put into operation. Another controls the boundary lights of the field's landing circle, and another the red warning lights atop the administration building, hangars and other structures.

San Antonio Mail Tube Proposed

PLANS to augment the aviation facilities of San Antonio, Tex., by the installation of an underground mail tube service between the local flying fields and railroad stations and the general post office have been announced by Mayor C. M. Chambers.

Firm Directs Flying at Baltimore Port

THE THOMPSON FLYING SERVICE has taken over the flying operations of the Curtiss-Wright Airport at Baltimore, Md. Charles F. Thompson and Stuart G. Dietz are the instructors and pilots of the company, which operates a flying school and chartered ships to any part of the United States. The new school has a student class of forty.

Indianapolis Airport Announces Plans

A TWO-DAY PROGRAM of air races and aerial demonstrations will be held at Indianapolis Municipal Airport, Ind., September 9 and 10, according to Charles E. Cox, Jr., superintendent of the airport. The events will form the dedication anniversary program of the field, where a five-mile triangular course and an official three-kilometer straightaway speed course have been established. The airport is planning the laying out of a golf-driving range at the field, possibly extending it into a nine-hole golf course.

Gains for 1932 over 1931 in transportation activities at the field have been reported. Total passengers using the airport were 18,785, as compared with 13,812 in 1931, and total planes clearing the port were 11,387, as compared with 9,825 in 1931. Student flights numbered 4,072. Outgoing and incoming mail totaled 35,582 and 39,995 pounds, respectively.

Runway transition strip trouble is reported to have been eliminated by treating the center of the open stone drain with asphaltic tar and gravel, under the direction of the airport engineer and manager, M. G. Johnson. The light projector, patterned after one designed by the Department of Commerce, has proved of assistance in traffic control.

Texas Airport to Be Established

IN ACCORDANCE with an agreement reached between the Chamber of Commerce and the City Commission, the city of Jacksonville, Tex., has acquired a tract of 185 acres, three miles from the town center, to be improved and used for an airport. The city borders on the Texas oil fields.

Youngstown Considers Field Purchase

THE CITY COUNCIL of Youngstown, Ohio, has authorized Mayor Mark E. Moore to begin tentative negotiations for a municipal airport. Mayor Moore has urged the purchase of a 300-acre tract of land just outside the westerly limits of the city as a new port. A sum of $150,000 is proposed for the project to be spent on buying and clearing the field and grading and equipping it.

Los Angeles Airport Reports for 1932

AN INCREASE of fifteen per cent in the volume of air traffic handled at the close of 1932 as compared with the last sixty days of 1931 was shown at the Los Angeles Municipal Airport. In his annual report to the mayor, Director R. B. Barnitz of the Los Angeles Department of Airports stated that the airport registered 61,048 landings in 1932, of which 9,470 represented student flights. Approximately 500 pilots and student-pilots are making use of the field regularly. Operating concerns at the field numbered eighteen at the end of 1932, as compared with thirteen at the close of 1931.

Light projector used in traffic control at Indianapolis Municipal Airport

The airport went through 1932 without a single accident, despite a heavier traffic total than all other airports in the Los Angeles metropolitan area together. The previous year was likewise without any mishaps of consequence. The field has witnessed but one fatality since its establishment as a municipal airport in October, 1928, and that was due to a test flight of an experimental job from elsewhere.

Runway areas have been resurfaced and extended during the last year, automobile driveways have been paved and curbed, drainage has been improved, additional landscaping has been completed in the vicinity of the building group and new meteorological apparatus has been installed. In this work the airport, as a municipal institution, has had the advantage of receiving large labor assignments from the county unemployment relief program.

The newest improvement contemplated at the airport is a hazard room or "dope house," plans for which have already been drawn. The building will be separate from other structures at the field and will be especially designed for its purpose.

Aeronautical Firm Expands

PAUL MANTZ, head of United Air Services, has enlarged his school, charter, motion picture work and forest patrol operations at United Airport, Burbank, Calif., to the extent of 7,000 additional feet of hangar space.

Portland Has Large Traffic Increase

AN INCREASE of almost 100 per cent over 1931 in the number of passengers carried by transport companies at Swan Island Airport, Portland, Ore., was reported for 1932. A total of 4495 passengers left the airport on planes of the company and 4300 arrived, as compared with 2380 leaving and 2200 arriving in Portland in 1931.

Floodlight Bought for Lunken Field

THE CITY OF CINCINNATI, OHIO, has purchased the latest type of SPERRY-AGA-BBT full-automatic arc and incandescent landing area floodlight for Lunken Field, according to an announcement by Capt. A. B. Wunder, manager of the field, and Edgar Dow Gilman, Director of Public Utilities of Cincinnati. This large floodlight, using the 180-degree dioptric lens, is equipped with an internal shadow bar which will enable the arriving or departing pilot to be kept in a zone totally without glare while the remaining portion of the landing area and adjoining obstructions are illuminated to full intensity. The floodlight with auxiliary installation equipment has been purchased from the American Gas Accumulator Co., Elizabeth, N. J.

Adams Succeeds Berry at Cleveland

E. E. ADAMS has been named temporary successor of Maj. John Berry as superintendent of the Cleveland airport. Major Berry, airport chief for seven years, resigned last month. Mr. Adams is manager of the Cleveland public hall and municipal stadium.

United Airport Kinner Dealer Chosen

GEORGE E. CERVENY has been appointed airplane dealer for Kinner Airplane and Motor Corp., Ltd., and will have his base of operations at United Airport, Burbank, Calif., where he will operate a flight school in conjunction with ship sales. He has taken delivery of one of the new two-place open-cockpit Kinners, which is powered with the 100-h.p. Kinner engine, and also will have a four-place cabin demonstrator.

Missouri Airport Improved

THE SPRINGFIELD (MO.) PARK BOARD, which has been relieved of active management of Springfield Municipal Airport by Ozark Airways, Inc., has authorized its engineer to remove wire hazards bordering the field, to do necessary draining and filling and to perfect the north-south runway. Since acquiring the lease of the airport, the airline has installed maintenance shop facilities, making available complete repair, overhaul and maintenance service to all airplane operators.

Twenty-one students received licenses in 1932 after completing training at the Ozark Airways school of aviation. Instruction is given in light three-place open-cockpit or cabin planes. The company plans to enlarge the training scope by the addition of a blind-flying training ship and courses in radio and mechanics.

Ozark Airways, Inc., also operates an airline between Springfield and Kansas City, Mo. Other operators on the field include J. Carl McCluer and O. K. Southwick.

Municipal Airport at Des Moines, Iowa

DES MOINES' municipal airport, which is to be formally opened next spring, covers 160 acres. Replacing a leased field which has been operated for the past five years, this airport is south of Des Moines, with paved state highways on the east and south sides, and is 5.2 miles from the Des Moines post office.

Two concrete runways, each 100 feet wide and 1,800 feet long and which intersect diagonally, have been constructed. The runways are connected to the concrete apron in front of the hangar by an all-weather approach similar in construction to the runways.

The hangar is 100 feet square and is provided with additional rooms on one side for heating plants, machine shop, office for the airport manager, space for the weather bureau and office and waiting rooms for United Air Lines. Three westbound planes and three eastbound planes of the airline's transcontinental service stop at Des Moines daily, and the company plans to spend $40,000 for hangar, offices and shops as soon as it can make a long lease with the city. This must await legislative action, since the city now can make a lease for only a year at a time.

The airport is under the supervision of P. Welsh, Des Moines City Parks Commissioner, while the actual administration is handled by A. Thomas, City Airport Superintendent. The city is spending $250,000 on the airport, the funds for which were provided by a bond issue approved by the voters of the city. Of this sum, $80,000 was paid for the ground, while the remainder is for grading, drainage, construction of runways, erection of lights and the removal of an all-steel hangar from the old site to the new location.

South Bend Traffic Gains in 1932

AN INCREASE of more than 3,000 in the number of passengers and a more than twenty-five per cent increase in both arrivals and departures from South Bend marked the past year at the South Bend (Ind.) Municipal Airport. The 1932 totals were 13,394 through passengers, 662 arrivals, 641 departures.

Radio Firm Takes Over Agency

THE AERONAUTICAL RADIO CO., of Roosevelt Field, Mineola, N. Y., has announced that it has been appointed as agent for the Western Electric radio and will be equipped for servicing all models of this radio.

Forest Service Airport Constructed

THE Forest Service field on Cayuse Creek, Ida., has been reported as nearing completion. The creek is a tributary of the North Fork of the Clearwater River, and the field is about forty-five miles southwest of Missoula, Mont. The airport will be used, as are the other Forest Fields, as an emergency field for forest patrol by air and for the transportation of material, supplies and men into the forest. It also makes the flight to Missoula from Lewiston, Ida., less dangerous.

Louisiana Airport Opens

THE Hammond, La., airport, located on a direct route between New Orleans and Chicago, was dedicated recently. It was announced that the American Airways had leased the airport as an emergency field.

Alabama Airport Acquires Radio System

RADIO equipment has been installed at Bates Field, Mobile, Ala., at an estimated cost of $10,000 by American Airways. Oscar Barney, manager of the field is in charge of the equipment.

Gaver Joins Air Associates, Inc.

CHARLES GAVER, hangar manager for several years for Air Services, Inc., of Roosevelt Field, N. Y., has become affiliated with Air Associates, Inc., also of Roosevelt Field, according to an announcement by F. Leroy Hill, president of the latter company.

Tulsa Airport Gains in 1932

DURING 1932, the busiest year at Tulsa (Okla.) Municipal Airport, 105,212 persons arrived and departed in 18,480 ships without accident, according to C. W. Short, Jr., manager of the airport.

This was an increase of 9,702 persons and 480 airplanes over the figures for 1931. Including student ships, 25,200 airplanes cleared the port, making an average of seventy landings and take-offs daily for the year.

Approximately 250,000 persons visited the airport in the past year, and approximately eighty ships were housed nightly in all airport hangars, showing an investment of over $250,000. The hangars will house 100 average-sized ships.

Since the airport opened on July 3, 1928, 358,120 persons have landed and taken off without injury to a passenger.

ASPHALT FOR RUNWAYS AND LOADING RAMPS

By C. W. SHORT, Jr.

Manager, Tulsa Municipal Airport

AT THE COMPLETION of our administration building at Tulsa Municipal Airport about one year ago, we built our loading ramp and runway. The loading ramp is approximately 150 feet by 300 feet, which is ample room for the loading and unloading of our thirty-four regular airline schedules daily besides other transient ships which load and unload at the terminal building. Our runway is 100 feet in width and 2175 feet running north and south. This loading ramp and runway was built with emulsified asphalt and has proved highly satisfactory.

First the ground was leveled, then along the entire edge of the runway and loading ramp we dug a ditch averaging about 18 inches deep and 12 inches wide. We placed about two inches of crushed stone at the bottom of this ditch, then laid a four-inch drain tile and filled the ditch with more crushed rock. This drainage system was connected at the low point to six-inch sewer pipe to carry any seepage off the field and prevent its getting under the runway proper.

Next we placed over the entire surface of the runway sufficient crushed stone, of maximum two-inch size, to give a three-inch layer after it was rolled with an eight-ton roller. We then sprayed this layer of stone with emulsified asphalt, using 2 3/10 gallons per square yard, the first application being at the rate of about one gallon per square yard, immediately followed by the second application of 1 3/10 gallons, sprayed on with pressure distributors. This base course was carried over the top of the drainage ditches, with the edges dropping down about six inches below the surface of the ground. This was done to provide for bringing the dirt over the edge of the runway, thus protecting the runway edges, as well as making it possible to take off directly across the runway, when necessary.

After the base course had been entirely completed, we placed over the entire surface a one-inch top mixture, composed of small-size crushed stone, sand and emulsified asphalt. This top was allowed to dry for 12 to 24 hours and then rolled, afterwards being given a seal coat of emulsified asphalt, using approximately one-fifth gallon per square yard. The runway was then ready for immediate use.

Although subject to heavy traffic immediately after being opened, the tail skids appeared to have very little effect on the surface, other than to leave a few slight marks, which subsequently disappeared. After seasoning for 30 days, the surface became so tough that the majority of the skids did not even mark it.

We believe this kind of runway surfacing has a number of advantages, in that it apparently withstands heavy shocks and impacts without any tendency to break or crack, and at the same time is very resilient. It also gives a non-skid texture to the surface. Extreme changes of temperature do not affect the asphalt, due to its elastic qualities, as well as to the fact that the moisture is effectively sealed out.

Another distinct advantage of asphalt construction is in the item of cost. Our asphalt runway cost an average of about one dollar per square yard, and we are assured that we can now make further extensions of our runway systems at even lower cost.

· AIRLINES and AIR TRAVEL ·

Mamer to Reopen Line to St. Paul

THE MAMER AIR TRANSPORT of Spokane, Wash., is developing plans for a high-speed passenger and express air transport service between Seattle, Wash., and St. Paul, Minn., to be inaugurated in the spring, using planes with cruising speeds of 180 to 200 m.p.h. They are expected to make the trip in a flying time of eight hours, including stops between Spokane and St. Paul. According to Newton Wakefield, vice president of the airline, intermediate stops will probably be made at Missoula, Butte, Billings, Miles City and Aberdeen, the same scheduled stops as were made when the Mamer Air Transport used to operate between Seattle and St. Paul.

It is planned to supplement the Department of Commerce weather broadcasting stations with short-wave radio stations located at strategic points along the route for ground-to-plane communication. Planes will be equipped with two-way radio sets.

In 1930 the Mamer Air Transport inaugurated a passenger service between Spokane and St. Paul, operating on a daily schedule of ten hours between these cities from June to the middle of October. A total of 236,560 passenger miles were flown during this period, with ninety-two per cent of scheduled trips completed on time.

Air-Rail Tariffs to South Lowered

SUBSTANTIAL REDUCTIONS in rail-air rates beginning last month between New York, Philadelphia, Washington and intermediate cities and Havana, Nassau, Jamaica and seven countries in the Caribbean are effected in joint tariffs arranged between the Trunk Line Association, the Southeastern Passenger Association, representing the railroads, and the Pan American Airways System. The railroads participating in the joint agreement are the Pennsylvania Railroad, the Atlantic Coast Line Railroad, the Florida East Coast Railway and the Richmond, Fredericksburg and Potomac Railroad, which operate the train service along the Atlantic seaboard to Florida. Pan American operates service over 22,000 miles of airways between Miami and thirty-one countries and colonies of the West Indies, Central and South America. The new joint tariffs represent reductions of approximately thirty per cent and bring rail-air travel down to the price level of ordinary surface transportation.

The "Havana Special," departing from New York daily at 10:05 p. m., has been designated as the connecting train providing a direct transfer to Pan American airliners at Miami. A full day's travel is saved by this connection to Havana or Nassau, reached in two hours by plane, and as much as two to four days are saved over surface travel time to Jamaica, Haiti, Santo Domingo, Porto Rico, Venezuela, Colombia or Panama Canal Zone, or Merida, Mexico, the other countries affected by the new tariffs.

The tickets allow stop-overs at any point on the rail or air lines up to a limit of four months. Pan American Airways System also will sell northbound round-trip tickets from the southern points to Washington, Baltimore, Philadelphia, New York and return.

Beacons Operate to Midnight Only

COMMENCING January 19, all airway beacons, boundary and obstruction lights at the Department of Commerce intermediate landing fields, from Site No. 3, Seaford, Va., to Site No. 13, Piscataway, Md., inclusive, on the Norfolk-Washington airway, are operated from dusk until midnight only, instead of from dusk until dawn as in the past.

New York - Nashville Line Opened

THROUGH PASSENGER AIR SERVICE was scheduled to be started late last month by Ludington Air Lines between New York and Nashville, Tenn. The new route is to be operated three times weekly on a nine-hour schedule, passengers leaving New York at 8 a. m. Mondays, Wednesdays and Fridays. Return trips from Nashville are made on Tuesdays, Thursdays and Saturdays. New scheduled stops to be added on the line include Roanoke and Bristol, Va., and Knoxville, Tenn., with Charlottesville and Lynchburg, Va., as flag stops.

Airlines Report November Traffic

SCHEDULED AIRLINES operating in continental United States carried 30,671 passengers in November, according to reports from the thirty-one companies operating, it was announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Miles flown by these airlines during the month were 3,643,717; express carried totaled 88,573 pounds, and passenger miles flown were 9,102,082.

Alaskan Airlines Unite

THE MERGER of the Ketchikan (Alaska) Airways and the Alaska Southern Airways with a new concern to bear the name of the latter and to operate three planes in southeastern Alaska next summer has been announced by J. V. Hickey. Mr. Hickey and A. C. McLean, of Seattle, Wash., are the sponsors of the new service.

United Reports 1932 Gains

BY INCREASING THE MILEAGE FLOWN eighteen per cent and passengers 107 per cent in 1932 over the previous year, and by flying ninety-five per cent of more than 13,000,000 miles scheduled, United Air Lines maintained its position as the largest air transport operator in the world, P. G. Johnson, its president, stated last month in reporting on the year's operations and in outlining plans for this year. Miles flown last year totaled 13,100,000, a considerable gain over the previous year's mileage mark of 11,115,000 miles. A total of 88,933 passengers was carried in 1932, as against 42,928 passengers transported during 1931. A sharp gain was registered in the amount of air express shipments carried, and the company cooperated with the Air Express division of the Railway Express Agency to stimulate business in this field to a new peak.

During the past year the company's service was expanded to include a total of forty-six cities in twenty states, and additional schedules were placed in effect on sections of the New York-Chicago route. During the year, the company completed substantial investment programs in hangar-depots along its airways and in extension and improvement of its communications network.

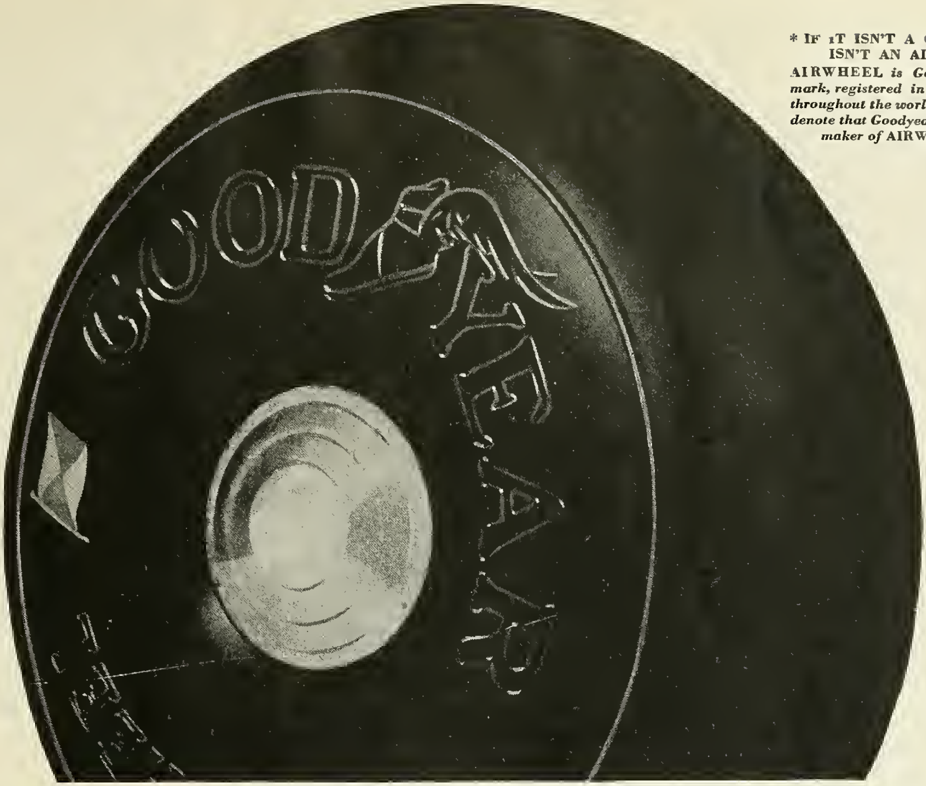
The company completed the flying of its fifty millionth mile of day and night operations, becoming the first airline in the world to reach its total. About 23,000,000 miles were flown at night.

TWA Negotiates to Buy Northrops

ACQUISITION of a fleet of fifteen new high-speed Northrop Delta type planes capable of cruising at 187 miles an hour was forecast in an arrangement made last month between Transcontinental & Western Air and the Northrop Corp. of California. The new equipment is to be used over the mid-transcontinental air mail route, as announced in the January issue of AERO DIGEST, and will shorten by several hours the present TWA transcontinental services of about twenty-two and twenty-four hours. The new ships, with a cargo capacity of 2,000 pounds, will carry mail, passengers and express.

According to the schedule which is being set by TWA, eastbound trips from Los Angeles to New York will be made in about sixteen hours, and eighteen hours will be consumed going west. Intermediate cities, including Pittsburgh, Columbus, Indianapolis, St. Louis, Kansas City, Wichita and Albuquerque, will be offered faster schedules for travel and delivery of mail and express as soon as these new planes are in operation.

(Continued on following page)



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You can't get all these advantages from anything less than Airwheel softness—because other types of tires do not operate at such low pressure.

Watch how passenger transport lines switch to the Airwheel in 1933. Or better yet—get in on these advantages by writing for full engineering data to Goodyear, Akron, O., or Los Angeles, California.

When you buy a new ship specify the Airwheel

GOODYEAR

(Continued from preceding page)

Airline's Offices Moved to Chicago

EFFECTIVE February 1, executive offices of American Airways are to be located at Chicago, according to an announcement by L. D. Seymour, president of the company. Approximately seventy-five employees and executives are affected by this move, most of them going to Chicago from St. Louis and Robertson, Mo., where operating headquarters were established about six months ago. The consolidation of Transamerican Airlines Corp. with the present American Airways system, authorized recently by the board of directors of the parent company, Aviation Corp., will increase the importance of Chicago as an operating center, and the move is being made coincident with the consolidation of operations of the two companies.

Headquarters for the executive personnel will be set up in part of the American Airways hangar built by Century Airlines at Chicago Airport. Executive officers formerly located at the New York office will make their permanent headquarters in Chicago.

Mr. Seymour has announced the election of R. C. Marshall, president of Transamerican Airlines, as vice president of American Airways in charge of operations for the eastern territory. He will have under his direct supervision the American Airways lines in the east and north-central states. C. R. Smith, vice president in charge of operations for American Airways, will have charge of operations in the southern territory with headquarters at Dallas.

Time-Saving Parachute Arrangement

THE AIR EXPRESS CORP., which inaugurated its coast-to-coast express shipment service in December, has equipped its pilots with parachute protection combining safety and avoidance of delay. Each pilot wears a specially designed Switlik harness of linen webbing which he attaches by means of two quick, positive connector snaps to the quick-attachable seat-type Switlik Safety Chute in his cabin chair. When he completes his share of the flight he leaves the Safety Chute in the seat, ready to be attached to the harness of the pilot who succeeds him. This permits the resumption of flight with minimum delay and provides permanent parachute protection for each pilot.

Pan American Adopts Insurance Plan

GROUP INSURANCE totaling approximately three and one-half million dollars has been arranged for all employees of Pan American Airways System, it has been announced. Of this sum, approximately two million dollars is already in force, and the remainder is expected to go into effect as soon as certain legal formalities can be complied with in the remaining four of the thirty-two countries and colonies where employees of the system and their families are stationed.

Complete coverage for both flying and ground personnel is offered by the plan. A low rate was obtained because of the operating record of Pan American Airways System and was further lowered to employees through the plan whereby the Pan American Airways System carries a substantial share of the premium cost. Within the United States and other countries where it is legally possible, the insurance is placed with the Travelers Insurance Co. The insurance has been placed through Parker & Co., aviation and general insurance brokers, of Philadelphia, Pa., and New York.

Shortest Mail Line Starts Operation

A. A. BENNETT has opened his winter air mail route between Boise and the gold mining camp at Atlanta, Ida.. said to be the shortest contract air mail route in the United States. It is sixty-five miles, over mountains and with no prepared intermediate landing field.

Special Dispatch Mail Proposed

A HIGH-SPEED, high-frequency transportation of mail between New York and Washington, with special delivery pick-up and service at both terminals, has been proposed by Ludington Airlines to the Post Office Department, according to a news report. The service also would benefit Baltimore and Philadelphia.

In accordance with the plan, the airline's cars or motorcycles would carry the mail between the airport and the post office, and the special delivery department of the post office would take care of the delivery to the person to whom the mail is addressed. A special pick-up system would handle the mail in the city of origin.

The proposed type of air mail would be carried at the rate of twenty-five cents for the first ounce with fifteen cents for every additional ounce. The rate for parcels would be sixty-five cents for the first pound with twenty-five cents for every additional pound. Maximum weight for each parcel would be ten pounds.

Texas Line Appoints Officials

THE TEXAS AIRWAYS, new passenger line between Dallas and Tyler, Tex., has announced the appointment of F. P. Carpenter, Jr., as district traffic manager with headquarters at the Tyler office of the company. The company features service twice daily between Dallas and Tyler with fifty-minute trips each way. The airline also opened a service to Fort Worth, Henderson and Austin last month.

New York-Miami Through Service

EASTERN AIR TRANSPORT last month opened a thirteen-hour through air service between New York and Miami, Fla. Connections are made directly with the Miami and West Indies route. Officials of the transport company have reported heavy bookings on the new service. Southbound planes leave Newark airport at 8 a. m. daily, and northbound planes depart from Miami at 5:20 a. m. Stops are made at Daytona Beach, Jacksonville, Savannah, Charleston, Florence, Raleigh, Richmond, Washington, Baltimore and Philadelphia.

Bowen Returns to Former Base

AFTER OPERATING from the Curtiss-Wright airport at Oklahoma City for more than two months, the Bowen Air Lines, Inc., have re-established city headquarters at the Oklahoma City municipal air terminal and will operate from the city field, according to L. G. Simon, general traffic manager. Don Johnson, former division operations manager for American Airways, will represent the Bowen line at Oklahoma City, succeeding Warren Mozley, who will become a pilot on the Braniff Airways, Inc. Bowen ships operate among Oklahoma City, Tulsa, Fort Worth, Dallas, Houston and San Antonio.

American Airways Shows 1932 Gains

AMERICAN AIRWAYS, INC., reported that 1932 was the best year in its history. Passengers carried for the year were 64.1% more than in the preceding year, air express showed an increase of 448%, while revenue miles flown in the year increased 34.2% over 1931.

These figures do not include traffic for Transamerican Airlines Corp., which was acquired by American Airways in December. Reports for Transamerican for the year show a 40% increase in traffic.

Holiday Season Benefits Air Express

REPORTS of Rogers M. Combs, Jr., of American Airways, Inc., chairman of the General Air Express system, show increases in traffic of more than 500 per cent for 1932.

During the Christmas period department stores and general mercantile establishments offered their customers the facilities of General Air Express. Many firms opened air express depots within their stores to afford buyers of merchandise the means of assured delivery on belated purchases for distant points.

General Air Express is composed of seven major airline companies, operating with a uniform waybill. An affiliated organization is the Postal Telegraph and Cable Co., whose employees handle the ground work of pickup and delivery of air express shipments.

(Contiued on following page)

Announcing the

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SUBSIDIARY OF UNITED AIRCRAFT & TRANSPORT CORPORATION

(Continued from preceding page)

Eastern Air Transport Report for 1932

IN PAST YEARS Eastern Air Transport has been building up its system of routes between New York and Miami, but in 1932 this company's progress took a new course. Instead of expanding into new territory, engineering, development and traffic work was done, which served to consolidate activities and to strengthen operation. One new route was inaugurated during the year, extending the system a total of 172 miles, whereas in 1931 a total of 1,324 route miles were added. The additional airway opened this year extends from Charlotte, N. C., to Camden and Columbia, S. C., and Augusta, Ga.

Air express service was added over the entire system in August. The express business, beginning with small volume, expanded nearly 300 per cent in four months.

In 1932, the company completed an extensive radio communication system, assisted in designing new airliners which will be put into service in 1933, evolved a practical reservation control system, built overhaul shops which permit the company to do all its maintenance work, began a thorough study of means of reducing noise in aircraft, and rebuilt one of its Curtiss Condors, improving sound conditions; trained its pilots in scientific instrument flying, and made other engineering advancements.

The fleet of new Curtiss Condors which will be delivered in the spring is a group of planes of greater speed and cargo capacity, carrying fifteen passengers at a cruising speed of 145 miles an hour.

Passenger volume during the year showed a substantial increase, but air mail volume dropped by over 100,000 pounds below 1931. A total of approximately 818,000 pounds of mail was flown, as compared with 934,000 pounds a year ago. The decrease is attributed principally to the advance in air mail postage rates in July. In the first half of the year the volume averaged 84,000 pounds monthly, whereas in the last half of the year the average was 57,200 pounds monthly.

Port Columbus Bulletin Board

A UNIQUE traffic information bulletin board has been erected in the waiting room of the administration building at Port Columbus, Ohio. Prompted by the increasing number of daily ship movements and train schedules, the new board is designed to inform air travelers and visitors, at a glance, of what schedules are due in and general information on the number and progress of all flights.

Space on the board has been allotted to Transcontinental & Western Air, American Airways, Air Express Corp. and the Pennsylvania Railroad. Each operator's daily schedules are shown by flashing red lights, indicating arrival of respective planes and trains at the airport. Blank spaces have been provided on the blackboard to permit traffic men to chalk up actual time of arrival and departure, whenever schedules are delayed. Provision has been made to accommodate fourteen additional flights, as business increases, as well as the present sixteen planes and six train schedules which now serve the airport every day.

The board was designed by Maj. William F. Centner, superintendent of Port Columbus, and was built by city employees of the Division of Municipal Airport.

TWA Describes 1932 Progress

AMERICAN AVIATION will have witnessed its best year when the books are finally closed on 1932, according to Richard W. Robbins, president of Transcontinental & Western Air. The air transport industry as a whole will have established a record of increased business in all phases except that of air mail poundage, which will probably show a decrease because of the increased postage rates which went into effect in July, he states. The 1932 history of aviation was one of expansion and increased, faster and more frequent service. Mechanical improvements and new flying equipment were placed at the service of the operators, and refinements in the art of aerial navigation were outstanding.

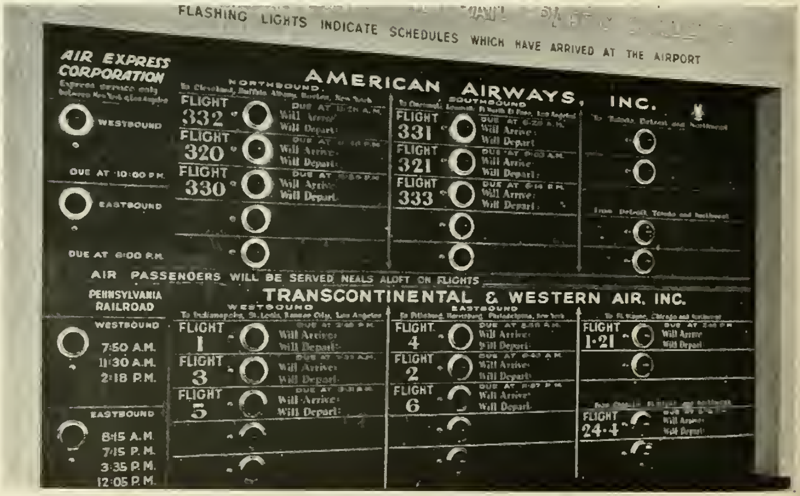
In Transcontinental & Western Air the outstanding events were the inaugurations of a twenty-four-hour coast-to-coast service for passengers, mail and express, and of a twenty-two-hour mail schedule. Travel time across the continent has been reduced fifty per cent in less than four years. Extension of its service into Detroit, Toledo and the Great Lakes area was another outstanding incident in the 1932 history of TWA, the new extension providing a twenty-two-hour service between Los Angeles and Detroit.

The great increase in air express traffic in 1932 resulted largely from the formation of General Air Express. Express traffic carried by all the airlines in the United States, according to estimates, totaled approximately 1,500,000 pounds in 1932 compared with 885,000 pounds in 1931.

The total number of passengers carried by air in 1932 was estimated to be slightly in excess of 500,000, compared with 457,000 in 1931, while the total mail carried by air was estimated at approximately 6,900,000 pounds in 1932, compared with 9,315,000 pounds in 1931.

Investments made by municipalities and by the airline along its transcontinental route provide evidence of the stability of the industry. Total investments along the airway for such structures as passenger terminals, improvements to airports and construction of maintenance bases exceeded $2,000,000, this total including the $300,000 for the maintenance base of TWA at Kansas City, the largest building of its kind in the United States.

The increased proficiency of pilots in instrument flying and their ability to operate mail planes through weather conditions formerly considered impossible for safe flying are probably the outstanding advances in actual flying, Mr. Robbins said. The inauguration of special merchandise plane service to care for the Christmas rush of shipping and the location of fast planes with a cruising speed of 140 miles an hour at strategic points to provide instant air express service reveal the growing practice of shippers to use the greater speed of the airlines in routine shipping as well as emergency shipments.



Airline schedules bulletin board at Port Columbus, Ohio

OUR READERS AIR THEIR VIEWS

Lion G. Mason, manager of Montgomery (Ala.) Airport, practices what he preaches in the following letter, for a few months ago his field abolished all hangar rates, marking a step toward the popularizing of airports which he advocates:

We now have many fine airports around the country, but apparently they are not being used, and especially is this the case of the private fliers. The airports make the expense of aviation too great and rather than cater to the volume of people with small means they seem to be keeping them away by high prices.

Make it cheap and convenient to own an airplane, and any community will develop its own enthusiasts who will spend a reasonable amount on aviation as a pastime or as a business. Cut out the high hangar storage fees, reduce the servicing and fuel rates to a fair margin of profit based on a reasonable amount of business, and you will see aviation grow on your field.

The private aviation market is confined to those who can see some definite advantage of aircraft ownership, and this type of business man or sportsman will not consider aviation unless he can get fair and equitable treatment and rates somewhat similar to automobile prices.

Our slogan at the Montgomery Airport is that an airplane is cheaper to own than any medium-priced car. Lower costs for hangar, for fuel, for labor and for airplanes will build up any airport and will build up service work by increasing the private fliers' use of airplanes. As time goes on, every airport will automatically show a profit, from volume which it can not show by trying to make a week's wages from one or two jobs.

T. Park Hay of Transcontinental & Western Air, Inc., suggests a help for simplifying the problems of life insurance coverage as applied to aviation:

During the course of a discussion at a recent life insurance convention I attended it was evident that there is no unanimous opinion on the subject of aviation coverage by the life insurance underwriters. This is self-evident because of the great variance of policy conditions offered to purchasers of new life insurance.

The desire for information shown by the underwriters led me to present to the convention the idea of the preparation of a simple, standardized aviation file, divided into leading subjects, which will be placed in the office of the actuary of every life insurance company. The file is to be so constructed and built up with loose-leaf additions that it will immediately reflect a true and accurate picture of trends in commercial flying.

As to some of the subdivisions of this file, it has been suggested that it contain, in the main, statistics under some of the following heads: Technical, in which will be recorded, in lay language, a résumé of the successful application of all instruments and what they are contributing to the safety of flying; regulation, which will record all regulations covering the flying of passengers instituted by the Aeronautics Division of the Department of Commerce and all amendments thereto; operations, under which heading will be filed reports of operation, efficiency records, achievements in engine performance, including a record of intermediary landings and reasons therefor, and a subdivision for accidents. In this file will be the official reports of accidents, compiled by the Department of Commerce, which body reports and places responsibility for accidents on airlines in the same way that the Interstate Commerce Commission does with the railroads. Here the actuaries will have official information in their own files, kept up to date, in place of newspaper accounts which are often incorrect and printed before the real facts are known.

A method of launching a glider is described by Howard A. McMurray of Pennsylvania, who also tells of his convertible plane-glider:

I have been flying a Cadet II glider for almost three years and think it is the best sport ever conceived. Your article, "The Launching of Gliders," by R. E. Dowd, was very interesting. The method used by A. L. Lawrence is very good; I thought of the same method myself and have been using it for over two years.

It was always hard to pick up a ground crew when you wanted them, so I started experimenting with car power other than auto tow, as we have no level fields around. I first tried tying 200 feet of rope to the shock cord, fastening the rope to a stake driven in the ground and drawing the glider back with a car which had a release fastened to the bumper. This proved unsatisfactory, as the pull died too quickly. I later changed the release to the tail skid with the handle in the cockpit. I now seldom use the pulley but run the car straight ahead of the glider until the shock cord is stretched out, then release the tail rope, and I am 100 feet high in a few seconds. The car runs ahead in second and keeps the cord taut until I am ready to release it from the nose.

Most gliders have a release which is a hook that snaps shut. I know of a half dozen times when the glider started off with the hook open, and when the rope slackened up, the ring closed the release unknown to the pilot and pulled the glider over on its nose. Therefore, I stopped using the pulley method.

I have revamped my Cadet by cutting off the front section back at the wing and putting an extra seat under wing in center of gravity. I then made an engine mount to fasten in front. This mount is compact in one unit, consisting of a Henderson motor, gas tank, switch, choke, throttle which is fastened to fuselage by four bolts. Thus I have a two-seater glider with dual control or a single-place light plane in a few minutes' time.

H. A. Hentschel of Oklahoma protests against state laws forbidding the flying of unlicensed ships:

The Department of Commerce has done much to advance in a safe line the airplane industry. Yet there are a few states that are today retarding the advancement of the air industry by the seemingly foolish laws which forbid an unlicensed ship to be flown. We are unfortunate enough here in Oklahoma to have such a law.

The Wright ship of 1903 was not licensed; it was flown after disappointments without number, changes and trial after trial. Today the younger generation, college boys without high capital, but with great ingenuity, the will to try, are working with steel, wood and fabric to build their conception of new airplanes. When these ships are finished they are tied to the ground by these state laws. The only way to eliminate airplane accidents to the minimum, as far as it is humanly possible to do so, is to perfect better designs, better engineers and flying equipment. A very small percentage of accidents is due to structural failure.

These amateur designers and builders are the ones who will carry on this work in the future. Their airplanes, regardless of license, are their ideals, dreams and efforts, put into reality, and each one brings out something that is an advantage in design or manufacturing. Could Wright, Curtiss or Blériot, have advanced had they been held by such laws?

The bystander who knows nothing of the airplane, its builder and safety factors should be protected by prohibiting the carrying of passengers in unlicensed ships. But when it comes to depriving a man of the right to get into a ship that he has striven to build and complete against odds, it is destructive to the youthful builder and to the industry.

• THE AIR SERVICES •

Air Corps Progress in 1932

ACHIEVEMENTS of the Army Air Corps during the past year are described in a review of 1932 prepared by the Air Corps. Attention also is called to the present status of the organization and its various sections.

Ending June 30, 1932, the fifth year of the Air Corps Five-Year Development Program closed with the air force of the U. S. Army Air Corps in fourth place, numerically in personnel and tactical airplanes, among the air forces of the world. A shortage of 396 officers and 221 serviceable airplanes below their quota in the five-year program is noted. According to the last complete report, October 31, 1932, Regular Air Corps officers numbered 1293 plus 77 officers detailed to the Corps to take flying training, 303 Reserve officers on extended active duty, 27 warrant officers, 12,903 enlisted men and 301 flying cadets. A total of 1509 serviceable airplanes plus 70 ordered was reported on June 30, 1932. Observation aviation, or the air service, was in better condition than the air force, or bombardment, pursuit and attack units. The nineteen National Guard squadrons were maintaining their authorized airplane strength.

The review tells of various service tests of planes and other equipment being made during the year. Structural research is being directed toward wing design, with stress analysis and design having been finished for an all-spot-welded, corrosion-resistant steel wing of the stress-covering, single-web, cantilever type. Lighter-than-air development was marked by progress in the construction of the TC-13 dirigible.

An engine-testing laboratory was completed in which conditions of high-altitude flying might be simulated. Lubricating oil tests resulted in pronounced changes in oil specifications, and the Air Corps has entered upon a test program of oils produced by aluminum chloride synthesis.

Progress has been made in avigation, particularly in regard to the application of radio in flying in fog and blind landings. The record long-range photograph, which covers 7200 square miles, was taken of Mt. Shasta, Calif., from a distance of 331.2 miles by Capt. A. W. Stevens in January. Captain Stevens also took the record high-altitude photo from a height of 39,150 feet near Rushville, Ind. Aerial photographic sections of the Air Corps photographed more than 48,000 square miles of territory for various Government departments for non-military mapping purposes. Army scores at the aerial bombing and machine gun matches at Langley Field, Va., in September exceeded the high scores of previous years in each of the four events, while the bombing average of the Air Corps was not much lower.

Navy Receives Fighter Biplane

CURTISS AEROPLANE AND MOTOR CO. recently delivered the XF11C-1 single-seater Navy fighter biplane to the Naval Air Station, Anacostia, D. C., for service acceptance trials by the board of inspection and survey. This airplane is powered with a Wright Whirlwind R-1510 two-row radial engine of 700 h.p., which was described in detail in the January AERO DIGEST.

"Saratoga" Commander Retires

CAPT. GEORGE W. STEELE, commanding officer of the *Saratoga*, aircraft carrier, was placed on the retired list at his own request January 1. He is succeeded by Capt. Rufus F. Zogbaum, Jr., who has been in command of the Naval Air Station at Pensacola, Fla., since 1931.

Captain Steele, who has completed thirty years in the Navy, has been a commander of the *Los Angeles* and of the Naval Air Station at Lakehurst, N. J. Captain Zogbaum is a former commander of the aircraft carriers *Langley* and *Wright*. He has been succeeded at Pensacola by Comdr. Ralph Wood.

Navy Plans National Reserve Training

A PROJECT for training Air Reserve members to be chosen from college seniors throughout the United States has been announced by the Navy. A certain quota will be selected from each area. These men will receive preliminary instruction for a period and later will go to the Pensacola Air Station for final training. Applications should be received by the Navy Department not later than the 15th of April.

New York Flight Surgeon Transferred

MAJ. P. D. MOULTON, oldest flight surgeon in the Army Air Corps in point of service and physical examiner of many pilots on Roosevelt Field, N. Y., has been transferred to an Army post in the Philippines. The major has examined over 7,000 pilots since being commissioned.

Texas Radio Station Increases Range

ANNOUNCEMENT has been made that radio broadcasting equipment at the Army airport station at Midland, Tex., has been increased to afford a daytime range of 5,000 miles and an unlimited range at night. The station at Midland is equipped with complete radio and meteorological devices.

Award Won by 26th Attack Squadron

THE annual trophy for flying proficiency and maintenance of aircraft for the past training year has been won by the 26th Attack Squadron, stationed at Wheeler Field. The 26th acquired the best record of all Air Corps squadrons in the Hawaiian Department, completing 2,751 hours of flying, an average of 250 hours for each plane, without a forced landing. It not only completed its training schedule but continued fourteen per cent beyond the schedule required.

Officers Take Extension Course

FORTY-THREE Air Corps officers at Luke Field enrolled recently in the classes of the Army extension course of the Air Corps School. This course covers a number of different subjects, each subcourse pertaining to one of the military knowledge qualifications prescribed for an Air Corps officer.

National Guard Activities at Boston

THE 26TH DIVISION AVIATION, Massachusetts National Guard, is established in its new building at the Boston Airport. The structure is a combination administration building and hangar, housing all the activities of the division under one roof.

The general staff of the division recently completed the first semester of an observers' school established by the Division Air Officer, Lt.-Col. L. E. Boutwell, for the purpose of familiarizing the officers of the staff with the problems encountered in aerial observation, to demonstrate its scope and its limitations, and to provide sufficient training in that subject so that each staff officer could, if the occasion arose, be detailed to make an aerial reconnaissance. The course will be resumed when weather permits next spring.

Such missions as practice in communications involving the establishment of message pick-up stations and panel stations; defense against aircraft, and contact missions have been conducted with other branches during the last training year. The organization also has completed making aerial photographs of every state armory in Massachusetts for the State Quartermaster's Department. The executive department of the state has used air transportation extensively.

Training is being kept up to a high standard, and every Saturday afternoon a scheduled training program is carried out. Two-way radio communication has been developed to the extent that conversation between ships, and from ground to ship and back, are now part of the weekly schedule problems.

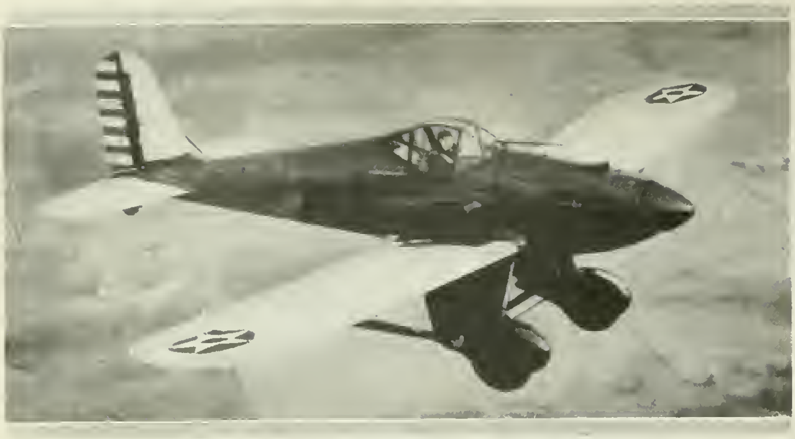
(*Continued on following page*)

on LAND or SEA
with CORSAIRS

Vought "CORSAIRS" have the invaluable characteristic of versatility. As landplanes or seaplanes they can be equally at home on water, carrier deck or landing field. They have merited the recognition of the United States Navy by virtue of their rugged dependability and perfect performance; and they have proven their ability to meet any naval or military requirement with the armies and navies of foreign countries.

Chance Vought Corporation, East Hartford, Connecticut, subsidiary of United Aircraft and Transport Corporation. Sole export representative, United Aircraft Exports, Inc., 230 Park Avenue, New York City, New York, U. S. A.

CHANCE VOUGHT CORPORATION



Latest type Curtiss XP-934 pursuit airplane of the U. S. Army Air Corps

(Continued from preceding page)

Air Corps Tests Curtiss Plane

A PURSUIT PLANE known as the Curtiss XP-934 has been delivered to the Materiel Division of the Army Air Corps, at Wright Field, Dayton, Ohio, by Curtiss Aeroplane & Motor Co. of Buffalo, N. Y. The Curtiss XP-934 is a low-wing monoplane of all-metal construction, including the covering of the wing, which is strut braced. The fuselage is of the all-metal monocoque type.

The plane is unique in that it is the first Army pursuit plane to be equipped with slots and flaps, which are entirely automatic and are designed to come into full operation of their own accord at approximately 15 miles an hour above stalling speed. The pilot can lock them, however, in any position by operating a handle in the cockpit. Thus he is able to use the slots and flaps in obtaining a reduced landing speed and at the same time can glide faster than at the speed at which the slots would otherwise close. The landing gear is of fixed type with the shock absorber behind the wheel. An enclosed cockpit provides comfortable operating conditions for the pilot.

The XP-934 is powered by a liquid-cooled 650-horsepower Curtiss Conqueror V-1570 geared engine. The wing span is 36 feet and the length from nose to tail is 26 feet. The ship is reported to have a very high maximum speed.

American Air Force Leaves Nicaragua

AIRCRAFT SQUADRONS of the Second Brigade of Marines, based at Managua, Nicaragua, were ordered to leave Nicaragua last month, in accordance with the general plan of evacuation of all U. S. Marine and Navy personnel. The aircraft squadrons, with Capt. Francis P. Mulcahy, U.S.M.C., in command, have been engaged in operating against bandits, as well as transporting men and supplies, in all kinds of weather in dangerous mountainous country in Nicaragua. This mission has been successfully carried out with very few casualties.

The squadrons were ordered to leave in two groups, one group by way of Central America and Mexico to Brownsville, Tex., and the second by way of Belize, British Honduras, stopping at Havana before arrival at Miami. The twenty-two planes comprising the force arrived without mishap at Ancostia, D. C., January 12.

Air Corps Pilots Have New Uniforms

THE AIR CORPS recently placed a contract with the Switlik Parachute & Equipment Co. of Trenton, N. J., for 1,519 standard flying suits. These winter uniforms are two-piece and made of selected horsehide leather. Some are lined with lamb skins of beige color and some with camel hair cloth. This style has been adopted as standard for Air Corps pilots.

Marines Win Safe Flight Trophy

THE HERBERT SCHIFF MEMORIAL TROPHY, awarded annually to the Naval aviation squadron with the highest record for safe flying, has been won by the Marine Fighting Plane Squadron 10-M, stationed at San Diego, Calif. The squadron had a total of 1,862.25 hours in the air without accident during the fiscal year 1931-1932. Capt. Vernon Guymon commands the group which consists of six F6C-4 Curtiss Fighter planes. The personnel is composed of Captain Guymon, six other Naval aviation pilots and twenty-five enlisted men in various ratings.

This is the first time that the Schiff trophy has been won by a Marine squadron and the second time it has been won by a fighting plane squadron. Fighting Plane Squadron 3 won the trophy in 1930 with a total flying time of 4,958 hours. VF Squadron 10-M stood in forty-ninth place for the year 1931, when the trophy was won by the U. S. Naval Reserve Aviation Base, Floyd Bennett Field, Brooklyn, N. Y., with 3,441 hours.

Engineers Reduce Airplane Sound

AS THE RESULT of research by Army Air Corps engineers into the reduction of sound in military airplanes, it has been announced that it is now possible to silence a single-engine plane so that it can not be heard from the ground when it is flying at a height of about 8,000 feet under normal atmospheric conditions.

Principal sources of noise in an airplane are listed in the following order of importance: Propeller, exhausts, engine clatter and whistling wires. Air Corps' efforts toward noise reduction have been confined principally to the two chief sources. It has been ascertained that the tip speed of the propeller is the controlling noise factor, although the width, thickness and pitch of the blades are contributing elements. Best results in regard to quiet are found when a wide, thin blade, turning at the minimum practicable tip speed, is employed.

Commercial concerns skilled in muffler design cooperated with the Materiel Division of the Air Corps in attempting to produce successful mufflers for reducing exhaust noises. Both the commercial design and that of the Materiel Division are cylindrical in exterior shape, the latter being of much smaller diameter and shorter length than the commercial design. The Materiel Division's present design gives a back-pressure of five inches of mercury at cruising speed. For speeds to be used in silent flight the muffler gives only two inches of mercury. For use in higher speeds a cutout is provided. In this way the noise produced at the instant of the opening of the exhaust valve is suppressed. The noise produced at the exit of the exhaust manifold by these cylinder discharges may be interfered with by providing in the silencer a buffer chamber of suitable dimensions and by the use of tortuous passages.

Navy Places Gasoline Order

CONTRACTS have been awarded by the United States Navy for 1,318,000 gallons of Stanavo aviation gasoline to be supplied Atlantic seaboard points from New Jersey to Florida. These contracts will run until April 30.

Air Reserve Officers Meet

PROVISION of more flying time for Air Corps Reserve units was one of the principal problems discussed at the first business meeting of the Air Corps Reserve Officers' Association recently at Kansas City, Mo. Among other proposals considered were an aircraft replacement program, increase of cross-country flying limits for Reserve officers, insurance for Army pilots trained since the World War and the possibility of placing the Air Corps Reserves on a pay scale similar to that of the National Guard.

Ably Serving Stinson Planes

The huge Stinson tri-motored transport plane pictured here weighs nearly five tons. Its Goodrich Airplane Tires are built to withstand an impact of approximately 27 tons!

Goodrich Tires Make TAKE-OFFS . . . LANDINGS, safer . . . easier for these giant air liners

LIKE practically every other airplane manufacturer, Stinson Aircraft Corporation uses Goodrich Airplane Tires.

They find that these sturdy tires adequately meet the exacting requirements of their big tri-motored transport planes.

And Stinson's customers agree with them!

A prominent official of Ludington Airlines, large users of Stinson planes, wrote us recently: "We have used Goodrich Airplane Tires over a period of more than a year and a half, totaling some 23,000 hours of flying time.

"Their reliable construction, coupled with Goodrich's faultless service policy, plays a definite part in maintaining our 'every hour on the hour' service between Washington and New York."

On *your* plane Goodrich Airplane Tires will make take-offs and landings safer . . . easier, *wherever you fly*. A set of them can be easily and quickly installed on your plane.

See your nearest Goodrich dealer or write to the Aeronautical Division of The B. F. Goodrich Rubber Co., Akron, Ohio.

Goodrich *Airplane* Silvertowns

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Recent Aeronautical Patents

The following patents of interest to readers of Aero Digest recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C.

Variable-pitch propeller. John R. Zipay, Pittsburgh, Pa. (1,877,115)

Air-vent parachute. William L. Cunningham, Salina, Kans. (1,877,227)

Machine for use in determining the longitude and latitude and direction of flight of an observer. George M. Hayes, New York City. (1,877,459)

Flying machine. Eddie Burkhardt, Tacoma, Wash. (1,877,474)

Combined controlling device for steering and stabilizing aircraft. Mario de Bernardi, Rome, Italy. (1,877,498 and 1,877,499)

Snap-hook for parachute harness. Milton H. St. Clair, Trenton, N. J., assignor to Switlik Parachute & Equipment Co. (1,877,702)

Pilot's safety belt and buckle therefor. S. Switlik, Trenton, N. J. (1,877,704)

Aircraft propeller. Felix M. Covey, Duluth, Minn. (1,877,821)

Airship. William W. Pagon, Baltimore, Md. (1,877,956)

Propelling means for airplanes. John Squiers, Detroit, Mich. (1,878,011)

Automatic camber plate. Louis Unger, Warren, Mich. (1,878,030)

Airplane parachute. Benjamin Slipikas, Brooklyn, N. Y. (1,878,299)

Device for attaching fabrics to airplane ribs. Michael N. Matveyeff, Stratford, Conn. (1,878,417)

Engine starting apparatus. Romeo M. Nardone, East Orange, N. J., assignor to Eclipse Aviation Corp. (1,878,421)

Airplane construction. Edward A. Atalker, Ann Arbor, Mich. (1,878,723)

Spin-o-plane. William C. Thompson, Seattle, Wash. (1,878,732)

Radio beacon system. Marcel Wallace, St. George, N. Y. (1,878,737)

Airplane. Hugh W. Gabbert, Norwood, Ohio. (1,878,768)

Airfoil. Paul J. Henry, Long Island City, N. Y. (1,878,775)

Airplane. Earnest Beaver, McAlester, Okla. (1,878,808)

Airplane propeller. Edward Staats, Jr., Merrill, Wis. (1,878,907)

Airplane construction. Giuseppe M. Bellanca, New Castle, Dela. (1,879,039)

Aircraft construction. Griscom Bettle, Gladwyn, Pa., assignor to Edward G. Budd Mfg. Co., Philadelphia, Pa. (1,879,046)

Aviator's helmet. Stewart S. Cooper, Cincinnati, Ohio. (1,879,104)

Propeller. Mathew M. Egan, Fort Worth, Tex. (1,879,142)

Mechanism for directing flight. R. H. Goddard, Worcester, Mass. (1,879,187)

Propeller blade. Jakob Haw, Berlin-Staaken, Germany. (1,879,225)

Aircraft. Emery Koch, Maracaibo, Venezuela. (1,879,323)

Airplane wing with guide blades. Gustav Lachmann, Akasaka-Ku, Japan, assignor to Handley Page, Ltd., Cricklewood, England. (1,879,338)

Dirigible air sailing craft. Alvah H. Lawrence, Hamlet, Ind. (1,879,345)

Hydroservo brake. Raymond J. Norton, Washington, D. C., assignor to Bendix Aviation Corp. (1,879,432)

Seaplane. Harry H. Semmes, Chevy Chase, Md., assignor to Bendix Aviation Corp. (1,879,547)

Airplane wing. Serge Trey, College Point, N. Y. (1,879,594)

Wing for aircraft. Jean B. Icre, New York City. (1,879,618)

Regulator for adjusting pitch of propeller blades while in motion. Leigh H. Coolidge, Seattle, Wash., assignor to Coolidge Propeller Co. (1,879,659)

Duo-hydroaircraft. Otis E. Mantor, Monterey, Calif. (1,879,700)

Amphibion boat structure, amphibion aircraft and pneumatically operated and controlled aircraft. Igor Sikorsky, College Point, N. Y., assignor to Sikorsky Aviation Corp. (1,879,715; 1,879,716 and 1,879,717)

Apparatus for launching aircraft. Arthur Richards, London, England, assignor to Ransomes & Rapier, Ltd., Ipswich, England. (1,879,765)

Airplane wing device. Adolphe C. Peterson, Minneapolis, Minn. (1,879,821)

Aircraft. Isaac Schafran, New York City. (1,879,857)

Airplane control mechanism. Edward A. Stinson, Northville, Mich., assignor to Bendix Brake Co. (1,879,859)

Variable-pitch propeller. Rowland M. Hill, Milwaukee, Wis. (1,879,935)

Airplane. Carl B. Harper, Washington, D. C. (1,880,019)

Airplane wheel. Murry N. Fairbank, Cold Spring Harbor, N. Y. (1,880,079)

Propeller. John A. Pinaud, Atlantic Highlands, N. J. (1,880,104)

Fuse-setting device for aircraft bombs. Geoffrey H. Cooke, London, England, assignor to Handley Page, Ltd. (1,880,122)

Porous covering for aircraft. Victor Lougheed, Washington, D. C. (1,880,207)

Propeller for helicopters. Willem P. van Lammeren, Voorschoten, Netherlands. (1,880,302)

Propeller balancing mechanism. Frederick Charavay, Piqua, Ohio, assignor of one-half to Hartzell Industries, Inc. (1,880,313)

Airplane structure and airplane truss-joint construction. Earl J. W. Ragsdale, Norristown, Pa., assignor to Edward G. Budd Mfg. Co. (1,880,478 and 1,880,479)

Airplane structure and method of making. Earl J. W. Ragsdale, assignor to Edward G. Budd Mfg. Co. (1,880,480 and 1,880,481)

Airplane. William B. Stout, Detroit, Mich. (1,880,520 and 1,880,997)

Helico-lift autorotor for aircraft and the like. Frederick Wander, Jr., New York City. (1,880,550)

Bomb-sight alignment and rudder control. Mortimer F. Bates, Brooklyn, N. Y., assignor to Sperry Gyroscope Co. (1,880,671)

Aerial camera. Charles F. Keale, Jr., Stewart Manor, N. Y. (1,880,960)

Airfoil. Frank R. Maxwell, Jr., Boston, Mass. (1,880,967)

Indicator for aircraft. Elmer A. Sperry, Brooklyn, N. Y., assignor to Sperry Gyroscope Co. (1,880,994)

Airplane propeller. John Squieres, Detroit, Mich. (1,880,995)

Flying machine. Percival N. Willoughby, Broadstone, England. (1,881,008)

Safety device for airplanes. Paul Smith and Fred H. Mann, Brooklyn, N. Y. (1,881,034)

Aircraft propeller. William D. Hubert, Joliet, Ill. (1,881,080)

Aircraft and concealed stanchion for same. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,881,141)

Safety aircraft. Peter Apolloniou and Steven L. Chick, New York City. (1,881,159)

Metal-built aircraft. Henry C. A. Potez, Meaulte, France. (1,881,296)

Airfoil. Edmund P. Gaines, Columbia, S. C. (1,881,463)

Propeller. Owen G. Gilstrap, Portland, Ore. (1,881,486)

Aircraft propulsion means and aircraft. Emil Klahn, Mount Vernon, N. Y. (1,881,673 and 1,881,674)

Airplane. Alfonso Mariani, Erie, Pa. (1,881,792)

Safety device for airplane pilots. Ralph E. Nidy, Greentown, Ohio. (1,881,878)

Back pack. Erwin H. Nichols, San Antonio, Tex., assignor to Irving Air Chute Co., Buffalo, N. Y. (1,882,086)

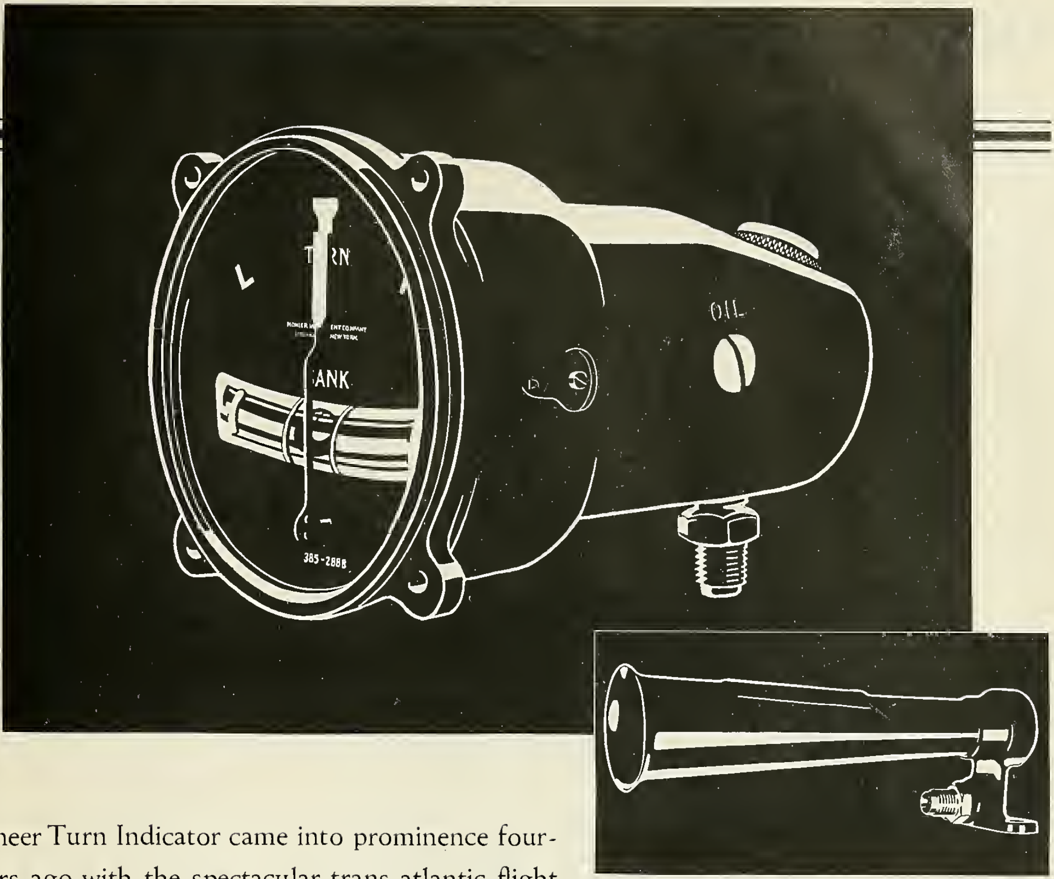
Fog training device for airplanes. William C. Ocker, San Antonio, Tex. (1,882,087)

Airplane. Charles E. Sparhawk, Auburn, Wash. (1,882,199)

Aircraft. Walter C. Clayton, Jenkintown, Pa., assignor to Pitcairn Aircraft, Inc., Philadelphia, Pa. (1,882,315)

Airplane. Ralph A. Reed, Detroit, and Harold A. Hicks, Dearborn, Mich., assignors to Ford Motor Co. (1,882,338)

Airplane strut. John F. Wallace, Cleveland, Ohio, assignor to Cleveland Pneumatic Tool Co. (1,882,349)



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The rigorously trained pilots of the Army and Navy maneuvering swift pursuit planes...the seasoned transport pilot upon whose judgment and ability the safety and comfort of hundreds depend daily, have confirmed the value of the Pioneer Turn Indicator.

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Although the principles of operation remain the same, many changes and refinements of design have taken place to increase its efficiency and performance. The Pioneer Turn Indicator continues as heretofore to be the one indispensable instrument for Blind Flight.

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NEW EQUIPMENT and METHODS

SOLDERING IRON STAND

G-M LABORATORIES, INC., of Chicago, Ill., have announced a type of soldering iron stand that is designed to effect a saving of 30 to 40 per cent in power consumption and to overcome many soldering troubles. The most serious difficulties in soldering work result from an overheated, dirty iron, and much defective soldering results from the tip of the iron's becoming pitted and corroded from excessive heat. By keeping the iron, when not actually being used, at the right soldering temperature, the G-M stand corrects this trouble, and the tip of the iron remains well tinned for weeks.

The G-M soldering iron stand has two cradles. When placed in the lefthand cradle, the iron receives only sufficient voltage to keep it at the minimum but proper soldering temperature for immediate use. The result is a saving of power and increased lift of the heating element. When the iron either is in actual use or is placed in the righthand cradle, full-line voltage is automatically applied to keep the iron up to temperature.

HYDRAULIC METAL-FORMING PRESS

ONE of the latest developments in the application of hydraulic pressure is the self-contained press actuated by means of individual pump equipment. Such a press has the advantages of smooth, positive action under any load, absence of vibration and noise, minimum floor space and low foundation and installation costs. In addition the pressure, stroke and amount of opening between the platens can be varied at will to suit diverse operating conditions.

The Chance Vought Corp., division of United Aircraft & Transport Corp., of Hartford, Conn., recently installed a machine of this type. Its primary purpose is the forming of streamline boots for airplane struts to lessen wind resistance, but it can also be used as a general utility press for various other purposes.

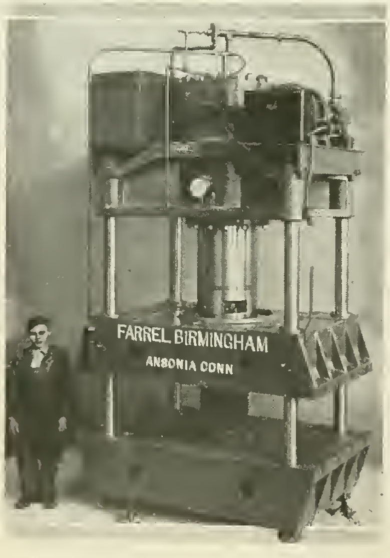
This press was built by the Farrel-Birmingham Co., Inc., of Ansonia, Conn., and is of 200 tons' capacity, with 24-inch-diameter ram having a 24-inch stroke. The single cylinder is a double-acting type, and its piston is equipped with hammered piston rings to insure long life. The 49½-inch by 80-inch moving platen is made of a special alloy iron casting and is equipped with renewable wearing bushings which have Alemite fittings for lubrication. The bottom, or stationary, platen and the top crosshead are made of the same material as the moving platen. The bottom platen forms the base of the press.

The operating medium is oil, which is supplied to the cylinder by the motor-driven pump mounted on top of the press. The supply of oil is contained in a welded steel tank, which is also mounted on top of the press. The tank is of sufficient capacity to maintain the oil at proper working temperature. Oil not only supplies the operating force but also acts as a lubricant, preventing wear of moving parts, lengthening their life and reducing maintenance.

To meet various working conditions, the pressure on the ram is adjustable by means of quick-resetting relief valves. There are no operating valves, all movement being controlled by a pendant switch with three push buttons for "start," "stop" and "reverse." The pendant switch can be swung to various positions about the press so that the operator can observe the work closely from the most advantageous point, with the press under absolute control. This electrical control provides the additional advantage of enabling the operator to "inch" the moving platen when setting dies. A limit switch prevents over-travel on the up stroke. The press control also can be equipped with an automatic timing device to provide for a dwell of any desired length of time at the end of the stroke.

AIRWAY BEACON BIPOST LAMP

THE AIRWAYS DIVISION, Aeronautics Branch, Department of Commerce, has adopted a type of lamp to increase the candlepower of rotating airway beacon lights by one-third, or a gain of about 400,000 candlepower, at no additional cost. Installation of special sockets capable of being used on the standard lamp changers makes beacon lights now in service adaptable to using the device.



Metal-forming press of the Vought Co.

The bipost lamp differs from the conventional incandescent lamp design in being mounted in a special socket by means of two hollow copper posts, the tops of which are coated with glass inside and out and welded, with the exhaust tube, to the bottom of a glass cup, forming the base of the lamp. The filament is assembled separately on a support composed of two vertical nickel channels joined by horizontal bars of insulating material. Construction of the lamp is completed by sealing on and exhausting the bulb. The bipost lamp filament is held in a definite relation to the base without the intervention of any glass parts, the current reaching the filament without passing through any metal confined within glass.

SPLICING AIRCRAFT CABLE

A RECENT AIR COMMERCE BULLETIN describes how to splice aircraft cable in compliance with the airworthiness requirements of the Air Commerce Regulations by means of using either the tuck or wrapped and soldered splice, fulfilling Army or Navy standards. The type of splice to be used depends upon the diameter and flexibility of the cable.

A tuck splice should be used in splicing flexible or extra-flexible cable of over 3/32-inch diameter, and a standard wrapped and soldered splice may be used on cable of less diameter. Nonflexible cable, which may be used for straight leads, also may be spliced by the wrapped and soldered splice. However, any swaged or compressed cable terminal of a type approved by the Department of Commerce may be used instead of the splices. In this latter case, it is essential only to indicate the type of terminal used on the drawings of the aircraft submitted for approval.

DULUX FINISH

PROFESSOR PICCARD, famous for his ascent into the stratosphere, who is now on a lecturing tour of America, used an American-made finish on the cabin of his balloon on the recent ascension. This finish is known as Dulux and has been recently developed by E. I. du Pont de Nemours & Company. It is made on an entirely new formula with a synthetic resin base and was chosen because, among other things, it was not absorbent to the sun's rays and, therefore, would prevent the creation of heat in the cabin, and also it would be resistant to mercury, in case this expanded on the trip. A further point was that luminosity was necessary for the interior of the cabin due to the reduced dimensions of the portholes.

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Flying habits that will not "hold up" are strangers at the Boeing School. At every point Boeing instruction is based on *facts* — the accumulated knowledge developed by 50,000,000 miles of air-mail and passenger transportation, and by the progressive research and construction methods of such leaders as Pratt & Whitney, Hamilton, Chance Vought, Sikorsky, Stearman and the Boeing Airplane Company.

All the subsidiaries of "United" are affiliates of the Boeing School. Each, from an essential part of the industry, contributes to the world's greatest body of flying knowledge. You get that knowledge here in one training—a training planned to see you to the top.

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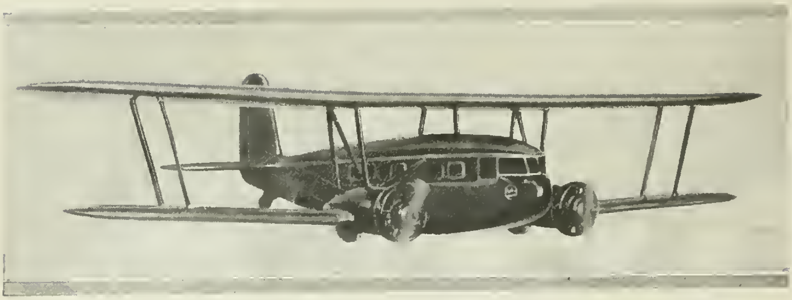


1933 CONDOR TRANSPORT

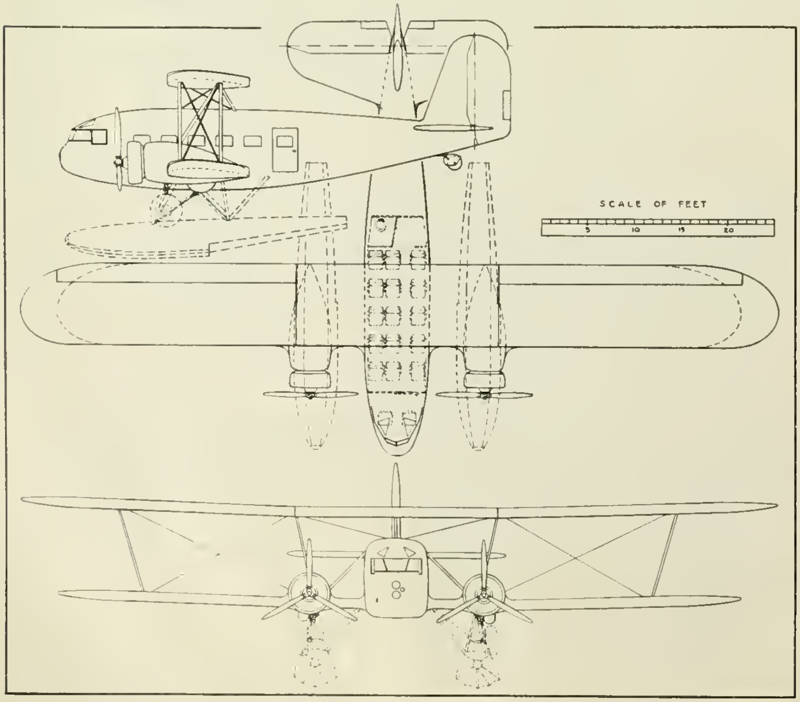
THE first of nine Curtiss-Wright 1933 Condor biplanes now under construction at St. Louis, Mo., will undergo flight tests in the early part of February, according to R. S. Damon, president of Curtiss-Wright Airplane Co. The new Condor will have a cruising speed of 20 miles an hour faster than multi-engine transports in general use on our airlines today.

Eastern Air Transport, which has been using 18-passenger Curtiss Condor transports for several years, will place five of these new airplanes in operation between Miami and New York. Transamerican Airlines, a Division of American Airways, will use four of the new Condors in passenger operations between Cleveland, Toledo and Chicago. The drawing shows how the plane appears as a seaplane, using twin Edo floats.

In the interest of low cost of maintenance, careful consideration has been given to simplicity in servicing and inspection. Quickly detachable cowling and inspection windows are provided; fabric covering is designed for ready inspection and low cost of repairs. Electric wiring is run in conduits with junction boxes, fuse boxes and pull boxes shielded to assist radio communication.

The upper wing span of the new Condor, 82 feet, is 8 feet 3 inches less than the Condors now in operation. The gross weight exceeds eight tons, carrying 15 passengers, two pilots, 200 pounds of mail and 450 pounds of baggage and express, a total pay load of 3,200 pounds. Mail and baggage is carried in compartments below the cabin floor.

The power plants used are the new geared nine-cylinder air-cooled Wright Cyclone R-1820F engines, rated at 700 horsepower at 1,900 r.p.m. The R-1820 engine, which was described in the October issue of AERO DIGEST, weighs only 1.22 pounds per horsepower and has a diameter of 53.75 inches.



Outlines of the new fifteen-passenger Curtiss-Wright Condor transport

Under the full load with one engine in operation, an altitude of 3,000 feet can be easily maintained. By reducing the load to one pilot, 10 passengers, baggage and 200 pounds of mail, the ceiling with single-engine operation is increased to 8,000 feet. By using supercharged Cyclone engines, an additional 2,000 feet of ceiling may be gained.

The geared engines drive slow-turning three-bladed propellers, thus eliminating much of the noise developed by fast-whirling propeller blades. Engine exhausts are run under the lower wing in order to keep this noise away from the cabin. Engine accessories include electric starting and generating equipment and vacuum pumps to drive the blind flying instruments.

Wings are of all-metal construction with duralumin ribs spaced about 10 inches apart. Fuel is carried in four 75-gallon gravity tanks in the upper wing. The tanks thus located eliminate any chance of vapor locks and the necessity of fuel pumps. All fuel may be directed to one engine if needed. The entire fuel system has only 18 fittings.

The electrically-operated landing gear retracts into the rear of the nacelles with only small sections of the low-pressure tires projecting. A mechanical lever actuates the retracting gear in emergencies. Three warning devices indicate the position of the gear.

The fuselage is constructed of welded chrome-molybdenum steel tubing, oiled inside for protection. Deep upholstered, high backed, reclinable seats are arranged in three rows abreast and five deep, facing forward, with a 12-inch aisle between. Cabin walls are fitted with sockets for tables for serving meals, writing, etc., while en route. Some of the chairs may be reversed in order that the passengers may play bridge or carry on conversations with greater ease. At each seat is an ash tray, coat rack, magazine holder, reading light and a call bell for steward service. Safety belts provided are of a new type, adjustable to the girth of the passenger and readily opened. The cabin interior is finished with a combination of fabric and leather.

The pilots' compartment is entered through the passengers' cabin. Location and large windows give unobstructed vision. Side and front windows slide fore and aft, affording full vision in rain. Seats and stirrup-type foot pedals are adjustable during flight. The dual wheel controls are attached to a single central column, and the engine control unit is placed between the seats. Overhead window glass is tinted, and an emergency hatch is provided in the roof. Space is provided for radio equipment to the rear of the pilots' seats.

The instrument board is mounted on rubber to reduce vibration. Blind flying aids include the Sperry horizon and directional gyro.

The tail assembly is of conventional design with adjustable stabilizer. All control surfaces hinge on sealed ball bearings, and control rods and horns are concealed so as to reduce resistance.

For more than six months engineers of the Sperry Gyroscope Co. worked on the problem of insulation of the cabin in order to make it as soundproof as possible. One fact learned through this research work was that the arrangement of material in sound insulation is probably more important than the material itself. A decrease of four decibels was accomplished by a slight rearrangement of the soundproofing material in the cabin walls and ceiling.

Positive ventilation, supplying fresh air through controlled outlets at each seat, is provided. The cabin heater also has individually-controlled outlets at each seat, with a master control available to the pilot, who may determine the cabin temperature by a glance at a thermometer. Through this system of ventilation, cool air may be admitted in warm weather through the heat ducts to augment the normal flow through the fresh air ducts. As no gasoline is carried in the cabin or fuselage, gasoline fumes are eliminated and the hazard of fire is reduced.

Specifications

Wing span	82 feet
Length overall	48 feet 10 inches
Height overall	16 feet 1 inch
Wing area	1.208 square feet
Gasoline capacity	300 gallons
Rate of climb	850 feet per minute
Service ceiling	15,500 feet
Absolute ceiling	17,500 feet
Top speed	170 miles per hour
Cruising speed	145 miles per hour
Range at cruising speed	560 miles

NEW FOKKER TRANSPORTS

THE DUTCH FOKKER CO. (N. V. Nederlandsche Vliegtuigenfabriek) of Amsterdam, Holland, recently announced that it has under development a number of new ultra-high-speed transports to carry more load at considerably greater speed than any existing multi-engine transport plane now in service.

One of the more completely developed planes is the F-XX which has been ordered by K.L.M., the Royal Dutch Air Lines. It is a trimotor capable of carrying 12 to 20 passengers, at 183 m.p.h. maximum speed and 155 m.p.h. cruising speed. In addition there is the F-36, a four-engined high-speed transport, also recently ordered by the K.L.M. for service between Amsterdam and Java, the longest airline in the world, 9500 miles. The F-36 will normally carry 32 passengers, but on the Dutch East Indian service it will be fitted with four compartments, each with convertible beds providing sleeping accommodations for 16 passengers. Besides there is a smaller high-speed trimotor for 10 passengers, a high-speed single-engine plane for mail or 8 passengers and a twin-engine design.

The F-XX will be powered with engines of 500-800 h.p. The first plane, the F-XX-A, is being fitted with three American Wright Cyclone R-1820F engines of 650-700 h.p. It has a useful load of almost 8,000 pounds and carries 12 passengers in addition to about 2,600 pounds of baggage or mail. An alternative design, the F-XX-B, which is almost identical, is fitted for 20 passengers.

In general arrangement the F-XX will fundamentally follow Fokker practice but will be entirely modernized.

The landing gear and tail wheel are fully retractable. The front wheels are supported on the outboard engine nacelles with no side braces to the fuselage. Therefore, when the gear and wheels are retracted into the nacelle and the opening covered by a sliding panel, the landing gear is completely hidden.

Separating the center engine and the pilots' cockpit is a baggage compartment of 28.3 cubic feet. The cockpit is fully enclosed and is just in front of the leading edge of the wing with the windshield and covering fairing into the wing in a manner to cause minimum disturbance of the air flow over the wing top. An unimpeded view is afforded on all sides. The cockpit is fitted with dual side-by-side control, adjustable seats and the usual instruments. Behind the cockpit and before the front spar is a room for the radio operator.

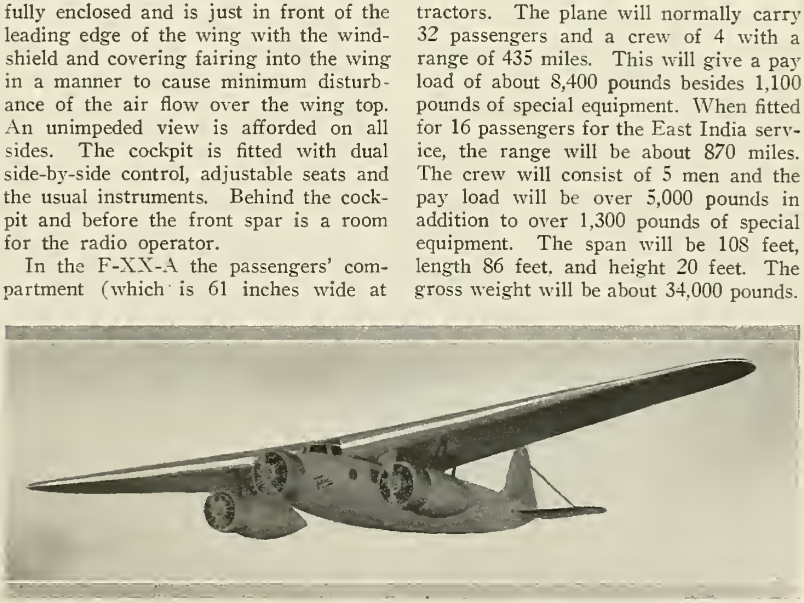
In the F-XX-A the passengers' compartment (which is 61 inches wide at the windows) is arranged in three separate sections for four passengers each, having 6 feet 3 inches headroom forward diminishing to 5 feet 6 inches headroom at the entrance to the lavatory at the rear. Also behind the passengers' section is a baggage compartment of 42.6 cubic feet capacity.

Rather than have 3 compartments for 4 passengers each, as in the F-XX-A, the F-XX-B will have one compartment for 2 passengers and 3 compartments for 6 passengers, thus providing for 20 people. In the wings on each side of the fuselage are baggage compartments between the spars, giving a total of 97 cubic feet. There is an additional compartment on each side behind the rear spar having a total capacity of 42 cubic feet, making a total baggage space of 212 cubic feet.

Structurally the fuselage differs from the normal Fokker design in that it is not rectangular in cross section but is of a polygonal type of construction, with autogenously welded steel tubes and having an elliptical outer form.

Though the airplane has a fuel capacity of almost 700 gallons, which gives it a range of about 900 to 1,000 miles, it is expected that normally the necessary range will not be more than about 435 miles when operating on most airlines. With fuel for this distance the airplane will have a pay load of 4,660 pounds in addition to 770 pounds for radio, night lighting equipment, chairs, toilet, etc. The gross weight with three Wright Cyclone engines is 19,140 pounds, of which 7,920 pounds is useful load.

The first F-36 will be powered with four geared Wright Cyclone F-1820-F engines with controllable-pitch propellers. All engines will be mounted as tractors. The plane will normally carry 32 passengers and a crew of 4 with a range of 435 miles. This will give a pay load of about 8,400 pounds besides 1,100 pounds of special equipment. When fitted for 16 passengers for the East India service, the range will be about 870 miles. The crew will consist of 5 men and the pay load will be over 5,000 pounds in addition to over 1,300 pounds of special equipment. The span will be 108 feet, length 86 feet, and height 20 feet. The gross weight will be about 34,000 pounds.



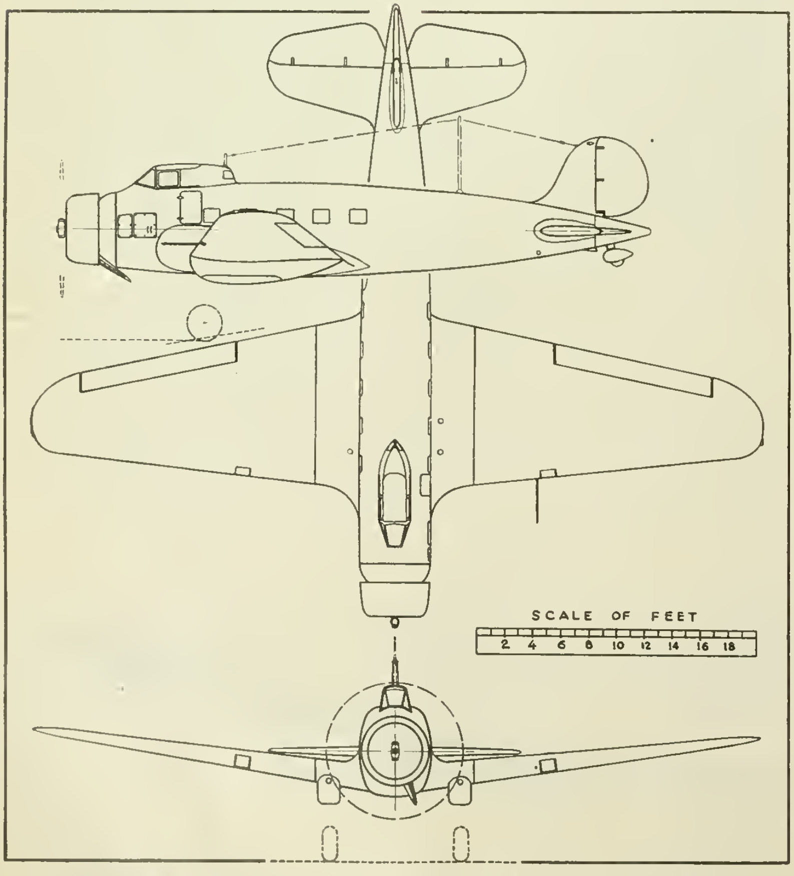
Artist's sketch of Fokker F-XX-A transport with three Wright 700 h.p. engines

CLARK GA-43 TRANSPORT

DEVELOPMENT of this airplane by the General Aviation Mfg. Corp. of Dundalk, Md., has been based on the primary desire to provide a safe, comfortable vehicle for the transport of passengers, mail and express which will produce the maximum possible favorable difference between flying cost and revenue. The flying cost per mile is reduced by increasing the number of miles traveled per hour without appreciable increase in flying cost per hour. It is estimated that the direct flying cost is less than 22 cents per mile, and that the revenue from passengers alone, because of time saving and comfort, will be more than 32 cents a mile, as a year-'round average.

The airplane is a cantilever monoplane of the low-wing type with a retractable landing gear. The structure is of metal, almost all being of high strength aluminum alloy.

Seats are provided for ten pay passengers, all facing forward, with wide aisle space. Room for mail, baggage and express is provided in three sealed metal compartments with doors isolated from the passengers' cabin. The cabin (including lavatory compartment) is approximately 20 feet 8 inches long, 5 feet 3 inches high and 4 feet 11 inches wide. It is comfortable, well ventilated and heated, free from noticeable vibration, and so quiet that conversation is possible from one end to the other.



Scale drawings of the General Aviation Company's Clark GA-43 transport

One door to the passengers' cabin is provided on the right side at the rear of the cabin proper, and there is an emergency exit on the left side near the front. The floor of the cabin and toilet compartment is quickly removable for inspection of control systems and structure.

Seats, adjustable for reclining by a small hand lever on the aisle side of each seat, are quickly removable, and seven fully reclining, adjustable lounges for night travel may be installed.

The pilot's cab is built above the fuselage proper in such a location that his fields of vision in all important directions are unobstructed. Windows are of heavy shatter-proof plate glass.

A complete set of blind flying instruments is provided.

Control systems are provided with sealed ball bearings, insuring wear for the life of the airplane.

Access to the pilot's cab is through a large hatch in the top which slides rearward. Large side windows may easily be opened independently, in flight, and practically no draft or rain enters them.

An emergency exit panel for the pilot is provided in the bulkhead between the pilot and passengers' cabin.

To protect the pilot in case of turning over (extremely unlikely in this type of plane), an arch, capable of supporting the weight of the loaded airplane, is built over the cabin.

Main instrument panels are grouped according to function. In the center, at the top of the instrument board, is a complete navigating panel, with engine instruments and the hydraulic landing gear retracting system indicating instruments on sub-panels immediately below. Backs of all panels can be reached by removing a small section of the cowling ahead of the windshield. All instruments may thus be conveniently disconnected, and each unit panel removed by loosening a few screws from the front. Electrical control panels for radio and lights are mounted in the side wall forward of the throttle.

A pair of slide-type indicators, one on each side wall, shows the position of the wheels, each being indicated independently through a simple Bowden type connection.

To warn the pilot if he should fail to extend the landing gear before landing, a device is installed which calls his attention to the danger.

This device consists of an electric motor, made badly out of balance, attached to the bottom end of the control stick; an independent electric circuit energizes this motor when the throttle control is brought back beyond an attitude corresponding to about 1200 r.p.m., and if, at the same time, both sides of the landing gear are not extended and ready for landing. The position of the throttle control at which the electric circuit is completed may be adjusted. While in flight if the pilot throttles below the set r.p.m., with the landing gear not completely extended and locked, the control stick is shaken by the electric motor with sufficient violence to give him ample warning. When the landing gear is extended and the engine throttled, the electric circuit is broken and the stick ceases to shake.

When not in operation on the ground the stick is locked by a V-shaped bracket which cannot interfere with operation when thrown out of action.

The fuselage is of semi-monocoque Alclad metal construction with smooth skin. Transverse frames and longitudinal stringers of flanged Z section make it easy to inspect quickly, clean and paint surfaces of metal parts.

The cross-sectional dimensions of the fuselage throughout its length are sufficiently large to permit easy and comfortable access, and there are no cross members or other obstructions. Two large doors in the solid bulkhead forming the rear wall of the toilet compartment allow access to the radio transmitter and receivers and to the rear portion of the fuselage. The streamline form of the fuselage is terminated at the rear end by a cap which is quickly removable, leaving an aperture through which access is provided. Men working through this hole and from the inside of the fuselage rear can inspect and adjust the stabilizer adjustment mechanism and elevator and rudder control systems which are enclosed in flight. Removal of the end cap leaves the entire tail wheel assembly exposed.

Forward of the passengers' cabin and underneath the pilot's floor is a mail or baggage compartment with capacity of 35 cubic feet with loading door on the right side.

Radio dynamotors, junction box and storage battery are contained in a sealed, ventilated compartment on the left of the fuselage aft of the firewall with access doors from the outside.

The tail may be lifted by inserting a bar through a tube passing through the lower part of the fuselage forward of the stabilizer.

Any one of the following engines may be installed:

The Wright F-1, 700 H.P. at 1900 r.p.m. at sea level, not supercharged for altitude.

Wright F-2, 650 H.P. at 1900 r.p.m. at sea level, maintaining that power up to 8000 feet altitude where rated r.p.m. is 1950.

Wright F-3, 625 H.P. at sea level at 1900 r.p.m., maintaining that power to 9500 feet, where rated r.p.m. is 1950.

Pratt & Whitney Hornet 1690-C, 675 H.P. at 2000 r.p.m. at sea level.

Fuel having an octane rating of 87 is used for all the above listed engines. The Wright F, using 73 octane fuel, rated at 600 H.P. at 1900 r.p.m. at sea level, may also be used.

Ready access is had to all parts of the power plant which may need inspection and adjustment. To reduce the aerodynamic drag of the engine-fuselage combination, the engine is enclosed within a quickly removable Clark cowl.

The engine mount is simple, open, and quickly detachable from the fuselage. Rubber cones at front and rear of engine mount reduce the transmission of vibration to the airplane. A device supporting the exhaust tail pipe permits free movement of this pipe in all directions to eliminate cracking and transmission of vibration.

Fuel tanks with a normal capacity of 96 U. S. gallons and a maximum capacity of 136 gallons are enclosed within the wing stub and sealed from the fuselage. Each of the three separate tanks may be dropped downward for repair. Three-way valve and wobble pump are enclosed within a fume-tight compartment at the bottom of the fuselage with pilot's remote controls and with access door from the outside of the fuselage. Fuel is supplied to the carburetor by a pump driven by the engine through a short, slightly curved flexible shaft.

The tapered cantilever wing uses the Clark Y airfoil section. The entire structure is of aluminum alloy except for heat treated chrome molybdenum steel fittings. A wing stub passes underneath the cabin and holds all the landing gear parts. Wide walkways extend the entire chord of the wing near the fuselage on each side. Jacking pads and lift lugs are attached to the outer ends of the forward center section wing spars. The primary structure of the outer wing panel is attached to the central wing stub by four bolts. Each outer wing panel has at its inner end a baggage compartment with a capacity of 26 cubic feet. Part of the wing is covered with smooth Alclad sheet and part with doped fabric. Ample inspection doors are provided.

Ailerons are of the Frise balanced type, with differential control. They are in static balance.

The cantilever stabilizer and fin have no exposed struts or wires. The stabilizer is adjustable in flight through an angle of nine degrees. The entire structure of tail surfaces is of Alclad in open sections, and covered with smooth Alclad sheet. To reduce maintenance costs, one surface of both stabilizer and fin is readily removable, giving complete access to all

Direct side view of the Clark GA-43 commercial transport with wheels in retracted position

metal surfaces and parts within the airfoil structure. Elevators and rudders are balanced aerodynamically and statically and covered with doped fabric with rigid torsion box covered with Alclad forward of hinge axes.

Goodyear 30 by 13 inch airwheels are used for the landing gear. Foot brakes and parking brakes are installed. During retraction and extension the wheels are always perpendicular to the ground and always point fore-and-aft. The wheel, with shock absorbing strut, moves directly to the rear and upwards, rotating about an axis at the top of an oleo-spring strut, which gives soft landing characteristics and smooth taxying. This system does not require cutting up the internal wing structure. The landing gear is actuated by means of a hydraulic pump; it may be retracted in eighteen seconds and extended in seven seconds. In the fully extended position the wheel is positively locked against fore-and-aft movement by mechanical means. With wheel not quite fully extended it is locked hydraulically against moving to the rear and the strength and the shock absorbing characteristics of the gear are as good as when fully extended.

Landing gear and superstructure parts may be easily inspected and adjusted as they are exposed to the ground mechanic, who may stand upright with head and shoulders in the open wing well into which the gear is drawn in flight.

The tail wheel swivels freely through 360 degrees and a device is used which tends to hold it fore-and-aft at all times.

To aid in moving the airplane in a hangar, the main wheels also become full swivelling through 360 degrees by removing a bolt at each wheel. Thus no lifting or no dollies are required.

Provision is made for the installation of two parachute flares and Western Electric two-way telephone equipment, with intermediate frequency receiver for reception of Government weather reports and beacon signals.

Specifications

Wing span	53 feet
Length over all	43 feet 1 inch
Height over all (on ground)	12 ft. 6 in.
Wheel tread	9 feet 6 inches
Wing area (incl. body section)	464 sq. ft.
Stabilizer area	43.1 square feet
Elevator area	40.4 square feet
Fin area	13.5 square feet
Rudder area	16.5 square feet
Aileron area	37.4 square feet
Volume of compartments	87 cubic feet
Weight, empty	2834 pounds
Weight of pilot	170 pounds
Weight of fuel, oil and pay load	2909 lbs.
Weight of instruments	49 pounds
Weight of cabin equipment	569 pounds
Weight of engine and propeller	1044 lbs.
Weight of fuel and oil systems	124 pounds
Weight of electrical equipment	233 pounds
Weight of miscellaneous equipment	68 lbs.
Total gross weight	8000 pounds
Engine (Wright)	700 h.p. at 1900 r.p.m

Digest of Technical Articles from Foreign Publications

By Elsa Gardner

EFFECTIVE DOWNWASH

Wind Tunnel Data on the Effect of Slipstream on the Downwash and Velocity at the Tailplane, F. B. Bradfield. (British) Aeronautical Research Committee—Reports and Memoranda No. 1488, June, 1932, 7 pp., 15 figs.

A COLLECTION of existing data on wind-tunnel tests on the effect of the slipstream on the tailplane of an airplane was analyzed. The author points out that with no slipstream, the tail lies in the downwash due to the wings and the local velocity is slowed up by the interference of the body and wings. The effect of the slipstream is to increase the downwash angle. The effective downwash angle was determined by finding the setting of the tail at which the normal force on the tailplane was zero, and the difference caused by the slipstream on this angle was found. The mean effective velocity, which is the uniform velocity which would give the same normal force on the tailplane, also was determined.

TAIL EFFICIENCY

The Efficiency of a Tailplane Mounted Behind a Wing of R. A. F. 34 Section, D. M. Hirst and A. S. Hartshorn. (British) Aeronautical Research Committee—Reports and Memoranda No. 1478, April, 1932, 4 pp., 6 figs.

A PRELIMINARY experiment on a skeleton monoplane consisting only of a wing and a tail connected by a "sting" is described. Extending behind the airfoil there is a wake of decreased total head which is a narrow band near the plane of the chord line at small incidences and extends upwards very considerably as the stalling angle of the wing is approached. In the vicinity of this wake there also is a drop in tail efficiency, defined as the ratio of the change of lift actually given by the tailplane to that which would be given in free air by the same change of incidence at the same flight speed. This drop is greater than the percentage drop in total head at low incidences and less than the percentage drop on total head over the stall. The wake appears to have little or no effect on the variation of the downwash along a vertical line.

AIRPLANE PROPELLERS

Considerations in the Study and Construction of Aircraft Propellers (Considérations sur l'étude et la construction des hélices aeriennes), M. Volpert. Revue Generale de L'Aéronautique, No. 14, 1932, pp. 149-193, 25 figs.

NEW conditions which are imposed on airplane propellers, either by the changes of an engine-airplane group from the general point of view of power and fineness, or by the demands of operation, are studied and how the propellers satisfy these demands is discussed. The new designs examined include metal propellers, thin and thick blades, adjustable-pitch propellers, both automatic and otherwise, and geared propellers. Changes in the airplane, such as in form of fuselage, spinner, distance to the leading edge from the plane of rotation, and how these changes meet the new conditions are taken up.

INTERNAL-COMBUSTION TURBINE

Prospects of the Internal-Combustion Turbine in Aeronautics (Prospettive della turbina a combustione interna nell'impiego aeronautico). A. Capetti. L'Aerotecnica, Vol 12. Nos. 7-8, July-August, 1932, pp. 973-1007, 24 figs.

OBSTACLES to the progress of the internal-combustion turbine, due to high temperatures and elevated angular velocities, are discussed. The author examines two types, one in which the combustion is effected at constant pressure within the open passages between the compressor and turbine, and the other in which combustion takes place at constant volume within closed chambers and fitted with a mechanism for periodical distribution. In regard to efficiency he shows that the two types are almost equal, but in respect to lower compression and greater facility of control he considers that the second type has more advantages, provided the construction of a distribution system suited to high frequencies can be solved. The performance of an airplane fitted with internal-combustion turbo-motors and variations at different incidences and altitudes are taken up, with special references to the advantages of such a turbine for high-altitude flying. An appendix is devoted to the operation of an exhaust-gas turbine for supercharging aircraft engines of the piston type.

STROBOSCOPIC RADIO COMPASS

A New Stroboscopic Radio Compass for Blind Flying (Un nouveau radiocompas stroboscopique pour la navigation sans visibilité), R. Hardy. L'Aéronautique, Vol. 14, No. 161, October, 1932, pp. 309-315, 17 figs.

BEFORE going into the details of his stroboscopic radio compass for aircraft, the author takes up the limitations of the present direction finders. He illustrates the waves of intensity received by the coils due to superposing the effect of a strong antenna and cross loops. He explains the Hardy compass in which the coil is rotated by a synchronous electric motor at the rate of 600 r.p.m., illuminating stroboscopically the compass six times per second. He describes the unique indicating system in which a special neon tube is used for producing a spot of light 10 mm. in diameter.

PROPELLER SOUND TESTS

Studies on the Sounds Emitted by Revolving Airscrews, J. Obata, Y. Yosida, and Sakae Morita. Tokio Imperial University—Aeronautical Research Institute—Reports No. 79 and 80, Vol. 6, Nos. 13 and 14, July, 1932, pp. 361-387, 389-440, 52 figs.

RESULTS are given of investigations on the sounds emitted by two propellers, one of wood and the other of metal. The sounds were recorded by means of an electrical arrangement consisting of a condenser microphone, a powerful amplifier and an oscillograph. A 2-A audiometer was also employed for the purpose of studying the relation between the loudness, the r.p.m. and the distance.

The second part of the report deals with experiments with model propellers, of one-third and one-quarter size. Sounds were recorded by a condenser-microphone, amplifier and an oscillograph, and the tone colors of the sounds of different propellers were studied by analyzing the records. Scale effect, effect of variation of the geometrical pitch and the directional property of the sound also were studied. A notable difference was found in the nature of the sounds emitted by the Reed metal propeller of twisted duralumin plate and a propeller of the usual thick form. It was found that the directional property differed with different propellers, while in the matter of scale effect, the smaller size seemed advantageous. The general effect of the propeller sound on the sensations of the person hearing them were also investigated.

AUTOMATIC SLOTS

Slotted R. A. F. 34 Bristol Fighter. Measurement of Forces on Slat in Flight, A. Ormerod. (British) Aeronautical Research Committee—Reports and Memoranda No. 1477, May, 1932, 6 pp., 30 figs.

FORCES acting on a slat in flight were measured for this report to provide data for stressing and estimating the action of automatic slots, and a slat spanning the upper R.A.F. 34 plane of a Bristol Fighter was used. Pressures were measured at mid semi-span and also near the wing tip over a range of incidence from 7° to 27°. At the mid semi-span section the greatest force coefficient of the slat, in terms of the speed of flight, was 2.35 at 27° main wing incidence. The greatest coefficient at the tip section was 1.75.

AERONAUTICAL PROGRESS

The Aeronautical Year, 1931-1932 (L'Année Aéronautique 1931-1932). L. Hirschauer and C. Dollfus. Dunod, Editor. Vol. 13, 439 pp., many figs.

THE THIRTEENTH ANNUAL REVIEW of aeronautics which is produced each year under the auspices of the Sociétè du Carbureteur Zenith follows along the same lines as the preceding issues and covers not only the French products and developments, but those of the whole world as well. In Part I, specifications are given for 29 airplanes, the C-24 autogiro, the *Oehmichen, Akron* and *Zodiac* V-11 airships, the FNRS balloon, as well as for 16 engines. The largest section is Part II, which is devoted to record-breaking flights of aircraft during the period January, 1931, to July, 1932. Descriptions of the aircraft exhibitions at Buenos Aires, Detroit (1931 and 1932), Stockholm and Athens are given under the aeronautical industry section. The commercial aviation section includes details of the airlines in the world operating during the period under review, and the progress of private flying in France. New Zenith carburetors for aircraft engines are described in the appendix, while a list of aeronautical addresses is also given.

AERONAUTICAL RESEARCH

New Methods of Research in Aeronautics, H. E. Wimperis. Royal Aeronautical Society Journal, Vol. 36, No. 264, December, 1932, pp. 991-1012, 10 figs.

A COMPARATIVE STUDY is given of the new wind tunnels of America and Europe, of the new testing tanks built especially for seaplanes, and of the new Farnborough vertical spinning tunnel. The author points out the enormous difference in scale between the new aeronautical tools being provided for research workers in England and those brought out in America, and shows where he considers the British laboratories justified in using smaller scale equipment. He discusses the compressed-air wind tunnels, the effects of Reynolds number, and the large air tunnel at Farnborough and compares the energy ratios of 14 wind tunnels of different types. He gives the details of the Royal Aircraft Establishment seaplane testing tank and takes up the possible applications of research on accelerated motion in seaplane testing. He refers to the R. A. E. vertical wind tunnel and the visualization of air flow before concluding with a discussion of the progress made in the suppression of noise.

SOUND TESTS

On the Acoustical Properties of Parabolic Reflectors, K. Sato and M. Sasao. Tokio Imperial University, Aeronautical Research Institute—Report No. 83, Vol. 7, No. 2, August, 1932, pp. 19-63, 8 figs., 7 tables.

A TRAIN of sound waves was made incident normally upon a parabolic mirror and the sound field was measured by the Rayleigh disk. The shapes of the mirrors used in the experiment were of three varieties and the experiment was performed in a soundproof chamber with five different pitches of sound. A plan of the acoustical laboratory is illustrated and described. The variation of the intensity along the axis, the effect of curvature, distribution of intensity on the plane perpendicular to the axis, and the sound field in front of the parabolic mirror were determined. It was found that the magnifying power of a parabolic mirror increases in proportion as the wave length decreases and is much smaller than that of the conical horn with the same opening and depth.

AERODYNAMICS

An Arithmetical Solution of Certain Problems in Steady Viscous Flow, A. Thom. (British) Aeronautical Research Committee—Reports and Memoranda No. 1475, May, 1932, 6 figs.

A METHOD previously developed for solving arithmetically problems of steady two-dimensional viscous flow in an incompressible fluid is extended to the special three-dimensional cases where the flow pattern in every plane radiating from a straight line is identical. Flow at a sudden enlargement of a circular pipe is selected as an example, this having a direct bearing on viscosity measurements. It is suggested that the pressure loss at such enlargement is practically the same as that which occurs when the smaller diameter pipe discharges through a plane wall into a relatively large vessel. The solution should give the value of the end correction in capillary tube measurements of viscosity.

AERODYNAMICS

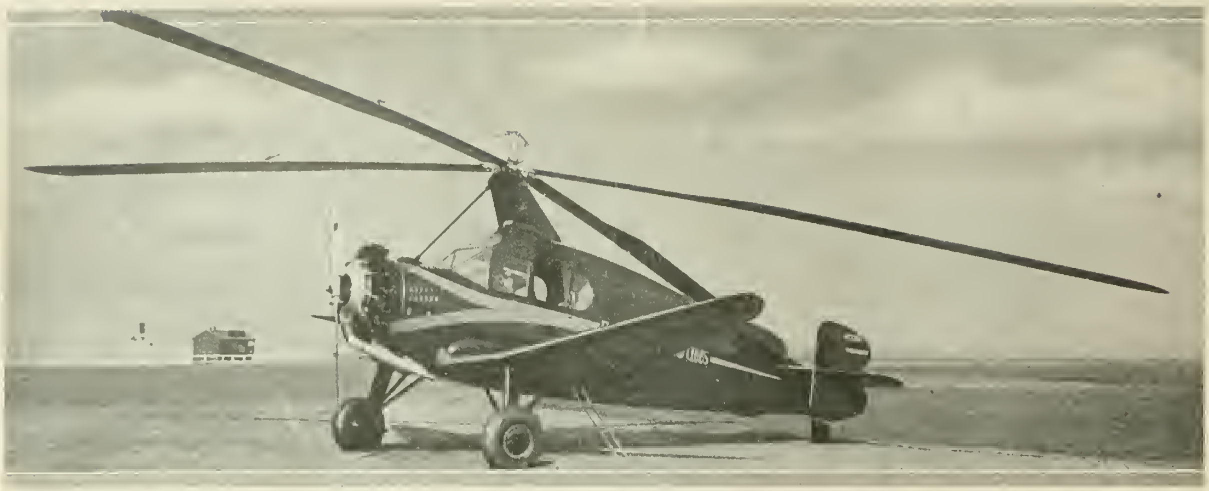
The Deformation of a Vortex in the State of Dissolution (La deformazione di un vortice in stato di dissipazione), G. Serragli. L'Aerotecnica, Vol. 12, No. 10, October, 1932, pp. 1311-1321, 4 figs.

DISSIPATION OF A VORTEX due to viscosity is the phenomenon investigated in this report. The author points out that the classical vortex theory ignores the effect of viscosity, assuming the unlimited persistence of vortices, whereas, in reality, a vortex tends to dissipate, due to viscosity effects. Starting with the Lamb and Villat formulas, he demonstrates that in the field produced by a vortex, there is found, in time, not only a decrease of the velocity but also a variation of the distribution of the velocity along the radius during its decrease. He represents the dissipation as a decrease of the intensity of the vortex and defines the vortex as a function of time, showing that this is possible in special conditions only. He makes some observations on the diffusion of the vorticity of the field and sets forth some experiments to explain the theory.

LOAD TEST JACK

An Improved Form of Jack for Use in the Load Tests of Aeroplanes, M. Yamamoto. Tokio Imperial University—Aeronautical Research Institute, Report No. 78, Vol. 6, No. 12, July, 1932, pp. 341-359, 16 figs.

CERTAIN DRAWBACKS in the ordinary jack used in load tests of airplanes are pointed out and the manner in which the objections were removed is described. By using the improved jacks and lamp board, overloading due to the jacks' supporting the wing tips was completely eliminated. As to the destruction test, if the point where the destruction began was known, the exact destruction load factor could be determined. The use of the improved jack also does away with uncertainties in the results of the elastic load tests due to inverse load as occurring in the use of ordinary jacks.



PITCAIRN PA-19 CABIN AUTOGIRO

Robert B. C. Noorduyn

BOTH motor car practice with its current luxury and comfort of interior appointment, and the really new development of aeronautical structure and form are contributory elements finding expression in this country's most recent autogiro design, the PA-19 model offered by the Pitcairn Autogiro Co. of Willow Grove, Pa. This ship represents the first of a production series developed from an experimental model which has been undergoing extensive flight tests for more than four months.

Mechanically the PA-19 embodies a number of features entirely new in application. The chief of these is the tilt-adjusting rotor and cantilever arrangement of wings, landing gear and tail surfaces. In their sum total the result is a machine of both good autogiro characteristics and that cleanness of design and degree of stability and control which pilots expect of good modern aircraft, whatever the type.

In the general layout, low parasite drag and the elimination of interference drag have been closely studied, without sacrificing passenger comfort, pilots' vision, simplicity and accessibility. In the construction of all components, no theoretical predilection for any material or process has been allowed to influence practical considerations, particularly those based on the owner's point of view in its broadest sense: Strength, reliability, ease of maintenance, comfort and appearance.

Based on many years of practical experience, the welded steel tube type of structure has been retained. Around cockpit and cabin particular attention has been paid to freedom from weaving and other deflections, and to strength against distortion in accidental damage.

No brace wires are used. The side trusses are of large diameter tubes and the top, bottom and panel bracing aft of the cabin section is formed by diagonal tension tubes. Attachment fittings have exceptionally large bearing surfaces to prevent wear.

In the design of the shape of the fuselage, first consideration has been given to visibility from the cockpit and comfortable accommodation for the passengers. Good streamline forms have been obtained by careful study of the structure, without eliminating members essential to complete bracing, without introducing distorted or complicated built-up members and without adding flimsy structures for carrying out fairing lines. Simplicity, proper design of welded joints and elimination of redundant pieces are the keynotes of this design.

Robert B. C. Noorduyn, executive engineer of the Pitcairn Autogiro Co. and author of the accompanying description of the new Pitcairn cabin autogiro, for whose design he is chiefly responsible, has, since 1911, been closely identified with concerns and individuals whose names have marked milestones in commercial and military aviation. Among these have been the Sopwith Aviation Co., Ltd.; Sir W. G. Armstrong; Whitworth and Co., Ltd.; British Aerial Transport Co., Ltd.; Anthony H. G. Fokker, and Giuseppe M. Bellanca.

To improve the pilot's vision the engine has been kept as low as possible, the same applying to the top cowl and the top of the instrument board; the cockpit is narrowed as much as possible at the instrument board, without reduction of leg room, and the upper corners are cut away at this point. The result is an extremely wide and unobstructed range, even in level or tail-low vertical descent; a window in the side of the fuselage opposite the pilot, above the floor line, adds a special check-up view of obstacles when settling down in typical giro fashion.

The fixed window framing is of all-steel construction, and the removable duralumin frames which hold down the glass are fastened with metal thread screws and nuts, wood screws in parts which may be detached for service being conspicuous throughout the ship by their absence. All windows except the special one above mentioned are of safety glass; the two alongside the pilot's cockpit are raised and lowered by automobile type window regulators. Particular care has been taken to fit all the glass in rubber, with a packing composition, to prevent water leaks.

The upholstery is luxurious; all the walls and the space under the floor and over the top of the cabin are packed with Dry Zero blanketing, the most effective soundproofing and heat insulating material known. The upholstery is carried out along the lines of highest class automobiles. A considerable study was made of springing and stuffing materials, seat angles and back shapes. The seat frames are of chrome molybdenum steel tubing and spot-welded stainless steel strip; the principal springing material in the seats and backs is the new rubberized curled hair.

The pilot's seat is adjustable by a screw mechanism in fore-and-aft direction for variation in leg room. The co-pilot's seat is of similar construction but only adjustable in position by moving the attachment bolts. The rear seat is 41.5 inches wide, thus providing spacious accommodation for two passengers.

Ventilators continually circulate fresh air through the cabin when desired. This makes it unnecessary to open the windows at any time, excluding noise to the maximum extent. Hot air for heating in cold weather is provided from a pipe inside the exhaust tail pipe through which air is driven by the slipstream.

Entrance to the cabin is made easy by the ample size of the door and the walkway on the wing. A step ladder of steel tube is carried concealed in the wing in flight and pulled out for use either from the ground or by a person standing on the wing.

The instrument board is attractively arranged, handsomely finished to match the upholstery and carries the following instruments: Altimeter, compass, air speed indicator, bank-and-turn indicator, rate-of-climb indicator, engine tachometer, electric rotor tachometer, electric gasoline level gauges, oil pressure gauge, fuel pressure gauge, oil temperature gauge, cylinder head temperature thermocouple, clock, oil level measuring rod accessible in flight. The board is directly lighted, with rheostat control for each light; the rear of the board, with all instruments and wiring, is accessible by lifting the hinged cowl, and there is an additional removable panel in the cowling above the instruments.

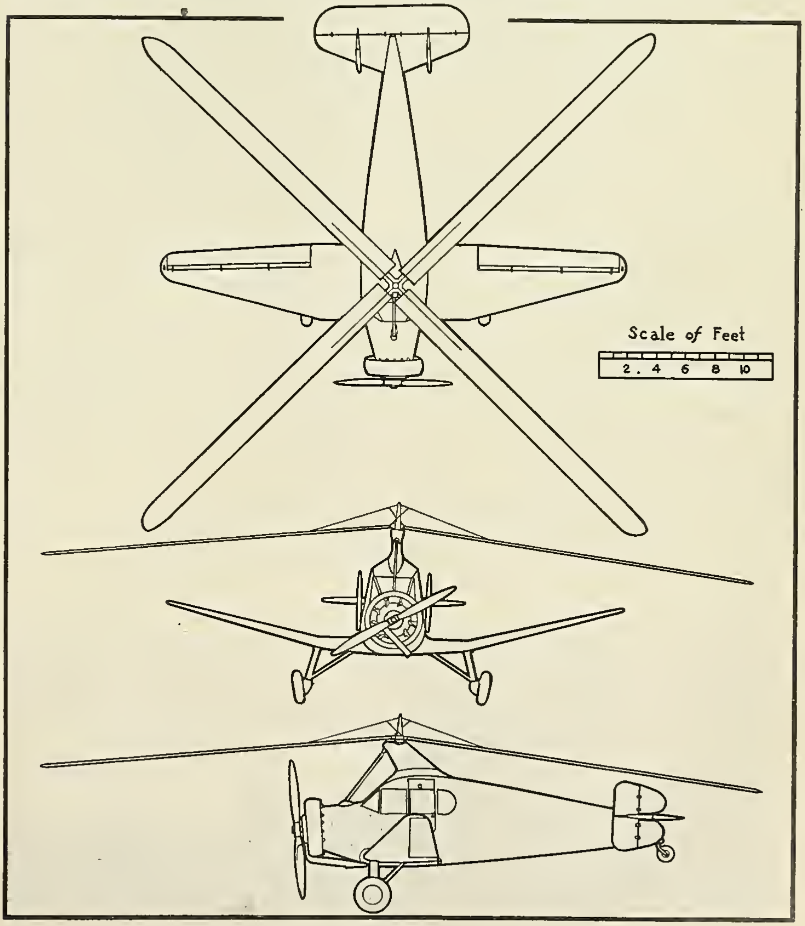
In addition to the instruments, the locking type pull handles for the rotor clutch, rotor brake and parking brake, as well as the handles for the control of the intake heat and oil radiator, the wobble pump operating handle, etc., are all located on the dash near the lower edge, thus leaving the side walls of the cockpit free of any controls. The electric starter is operated by a foot button.

A neat control column with swingover wheel for dual control is used. The co-pilot's rudder pedals fold down onto the floor with spring catches when not desired. This entire control arrangement leaves the space in front of the co-pilot's seat unobstructed, except during such time as the controls are taken over by him. All the control cables (those from the rudder pedal shafts as well as the elevator cables from the control column) are brought close together along the center line of the ship and aft to the tail in a channel under the floors. The same channel also houses all the electric wires in an insulated conduit and the gasoline lines from the tanks. It is accessible at any point, after raising the carpet, by pulling up one or more sections of the doors over the channel which form part of the floor. Each of the cables running from the cockpit to the tail is deflected only through a small angle over a pulley at the rear of the cabin, thus insuring exceptionally long life. At the rear end of the fuselage, the control cables are connected to two rocking levers, one of which moves the elevator through a connecting rod; the other, placed horizontally, moves the twin rudders through rods with self-aligning ball bearing ends lying inside the stabilizer. No parts of the controls and no horns are exposed outside the fuselage and wings, but they are all instantly accessible for inspection and adjustment. For this purpose, the last bay of the fuselage is closed off at the top and the rear by cowls with snap fasteners.

The aileron control bell cranks and ball bearing push rods are mounted on the center section of the wing so that when removing the outer wing panels with ailerons, it is necessary only to disconnect the rod at the aileron horn without touching the cables.

The rotor pylon is a complete innovation in autogiro design. The structure consists of one steel tube, four inches in diameter, which is built into a truss in the upper fuselage structure at its lower end and carries at its upper end the bearings on which the rotor head is mounted in such a manner that it can be rocked around an axis transverse to the center line of the ship. This main pylon tube is supported from the rear by a single tube running from the head of the main tube down into the upper fuselage trussing at the rear of the cabin section. The entire pylon structure is covered by a removable streamline fairing which curves into the upper lines of the fuselage. A clean exterior with small frontal area is the result.

The angle of incidence of the rotor, which can rock around the transverse axis as above described, is controlled by a rod and worm running down from the end of a lever, which itself is part of the socket in which the rotor axis is bolted, to a crank in a recess of the roof of the pilot's cockpit. By rotating this



Scale outline drawings of the Pitcairn PA-19 cabin autogiro crank, the pilot is able to vary the angle of incidence of the entire rotor relative to the ship, five turns being required to travel the entire range allowed. (By this means the pilot can maintain the rotor at its correct angle to obtain maximum performance in both vertical descent and forward flight conditions.) At the higher speeds the angle of the rotor is adjusted to its minimum incidence condition. In the low speed and vertical descent conditions, the rotor is rocked back to obtain a stable condition for the ship. At the higher speeds with the rotor rocked forward a small negative load is produced on the tail surfaces which gives the ship an exceptionally high degree of longitudinal stability. This negative load on the tail is controlled by means of a "pilot's assistor," a device which is attached to the controls at the will of the pilot during flight, is adjusted by turning a knob for any degree of pressure on the controls required and at the same time allows any movement of the control which may be required even while it is in action. This new means of stabilization and control has proved successful. A high degree of lateral stability also is present, due to the combined back sweep and dihedral of the wings, so that it is possible to let the ship fly itself without touching the controls for unlimited lengths of time, even in rough weather.

The fixed wings are entirely of cantilever design, in three sections, the center section of approximately 10-foot span being parallel in chord but tapering in thickness from the fuselage outwards, while the detachable outboard panels, about 10 feet long, taper sharply in plan view, are sharply swept back and are set at a large dihedral angle. The center section main structure is of steel tubing braced with heavy tie rods in the plane of the upper and lower spar flanges. The spars are built up as steel tube trusses which are heat treated before assembly with the rest of the structure. The drag struts also are steel tubes welded into sockets on the heat treated spars. The entire structure, thus braced solidly on all sides, is strong and rigid, as it of necessity must be to carry the load imposed by the wide landing gear, which is attached to it. Being braced transversely under the fuselage longerons and bolted rigidly to these by saddle blocks and U bolts, the strong center section further reenforces the cabin section of the fuselage against distortion.

The detachable outboard wing panels are of mono-spar construction. The structure consists of a single box spar which carries the aileron hinges on its rear face, transmits the bending loads through two bolts at its butt to the rear spar of the steel center section and is braced against torsion by a system of truss ribs, the resultant vertical load from which is carried into the front spar of the steel center section by a single bolt. Torsional rigidity is further obtained by covering the entire wing panel with spruce veneer which in turn is covered with balloon fabric as an additional protection against deterioration of the surface.

Ailerons are of large size and have a specially shaped leading edge in front of the line of the ball bearing hinges. Powerful control is obtained and retained down to the lowest speeds without being excessively sensitive at high speeds.

An independent tripod type landing gear is used under each end of the steel center section of the wing. The axle and oleo are of sliding cantilever type, which leaves all the landing gear attachment joints in fixed positions and maintains a uniform wheel camber throughout the nine-inch travel of the oleo. In landing with some drift, the shock absorption is directed at a favorable angle against the drift direction. Semi-balloon wheels, 9.5 by 12, are used and the wheel track is 12 feet.

The tail unit is interesting as a special development for the autogiro and its simplicity of construction. Stabilizer, fins and rudder are of cantilever construction, the former with wood spars rigidly bolted down to the fuselage structure, the latter of steel tube construction mounted in sockets bolted to the front spar and leading edge of the stabilizer. Due to the necessarily restricted height allowed by the rotor clearance and to remove them from any possible influence of the large fuselage, twin fins and rudders placed some distance outboard on the stabilizer are used, and they have proved to be especially effective at all speeds.

The elevators are of steel tube construction and supported, like the rudders, on cast aluminum alloy block split hinges which permit taking up clearance in the case of wear.

The absence of a rudder at the stern has permitted a simple and unusually accessible installation for the tail wheel. By removing the streamline cowl over the end of the fuselage with quickly detachable snap fasteners, the entire tail wheel oleo strut with its bearings is exposed for maintenance purposes. This avoids any necessity for openings, doors or zippers in the fuselage tail end, so that the latter is completely closed against the entrance of dirt, yet all parts of the unit are easily accessible.

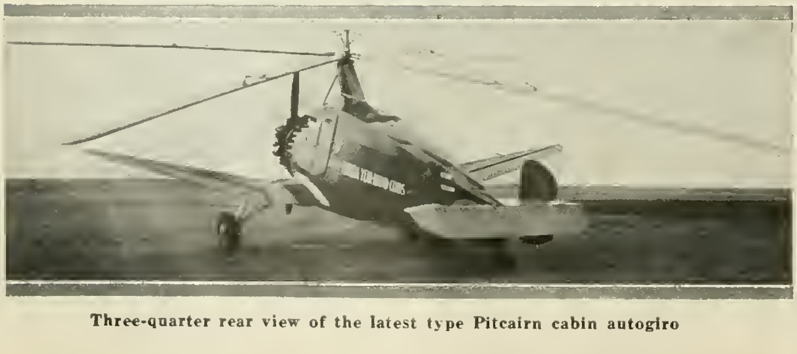
The engine installed in the first series of PA-19 is the Wright R-975 E-2, delivering 420 h.p. at 2,150 r.p.m. Provision is made to allow easy modification for the Pratt & Whitney Wasp Jr. T-3-A engine. Engine bolts are mounted through rubber blocks to absorb vibration.

A direct electric starter and generator are standard equipment. The battery is installed in the fuselage aft of the cabin and is accessible for maintenence or removal through an outside door.

Oil is passed through an oil radiator which is equipped with a combined scoop and cut-off so that, for the purpose of warming up, hot air from one of the cylinders can be passed through the radiator, while for cooling, cold air is taken in through a duct from a position in front of the cylinders. The engine compartment is accessible by lifting automobile hood type doors on each side.

The two aluminum fuel tanks, containing a total of 90 gallons, are slung below the cabin floor. The front tank contains a six-gallon emergency supply.

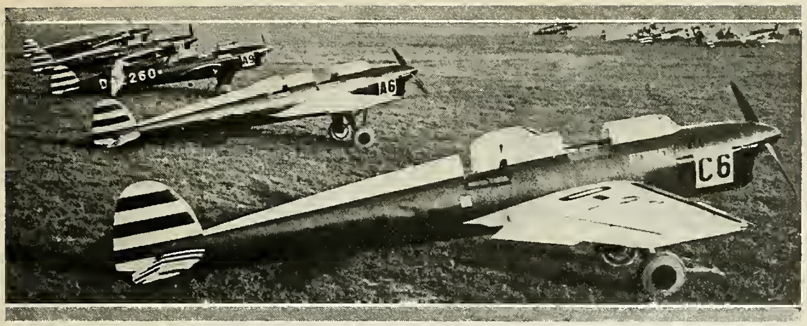
The full-load performances given below are with a Hamilton-Standard propeller with blades fixed at "climb" setting. By using a controllable-pitch propeller, the cruising speed is increased to approximately 107 miles per hour.



Three-quarter rear view of the latest type Pitcairn cabin autogiro

Specifications

Rotor diameter	50 feet 7½ inches
Length over all, with rotor..	35 feet 9 inches
Length over all, without rotor.	25 feet 9 in.
Height over all..........	13 feet 9½ inches
Weight empty	2,675 pounds
Weight of three passengers......	510 pounds
Weight of baggage.............	80 pounds
Pay load	590 pounds
Weight of gasoline (90 gal.)....	540 pounds
Weight of oil (8 gal.)..........	60 pounds
Weight of pilot.................	170 pounds
Total useful load..............	1360 pounds
Gross weight	4,035 pounds
High speed	120 miles per hour
Cruising speed	100 miles per hour
Landing speed	0 miles per hour
Rate of climb to 1,000 ft...	850 ft. per minute
Take-off distance without wind.....	260 feet



Heinkel Sport Plane

Powered with the 160-H.P. Argus As. 8R Engine

THE Ernst Heinkel Aircraft Corp. of Warnemünde, Germany, which has previously confined its activities to the production of high-performance mail and special-purpose aircraft (including the low-wing seaplanes regularly released with mail from the catapults of the *Bremen* and *Europa* on transatlantic crossings), in producing the He 64 light plane has designed a machine with particular regard to the competition requirements of the 1932 Challenge International de Tourisme. Herr Morczik and Lieut. Seidemann, both flying this type of machine, were singularly successful in the contest.

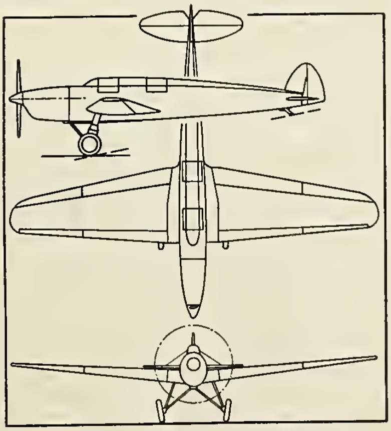
Contrary to previous European contests, last year's showed a marked increase in high speeds. In the 1930 contests the fastest plane was about 125 m.p.h.; the last contest brought speeds up to more than 150 m.p.h. The regulations specified a flying time of six days, instead of twelve as formerly, for the 4700-mile race. Lieut. Seidemann succeeded in flying the whole distance within three days. There were three main routes, and at each stop he landed ahead of the forty-two competitors. His average speed was about 145 m.p.h. The Heinkel team of five planes flew close together and landed at the end of each lap with consistent regularity.

The competition was divided into two parts—the technical examination and the flight itself. In the former the Heinkel planes were flown below 39.3 m.p.h., indicating a speed ratio of 1 to 4. The fuel consumption test brought the maximum number of points for the Heinkel planes, their fuel consumption being less than 16.5 pounds for a flight of over 62.5 miles.

Low landing speed has been obtained by the use of slots and flaps on the wing. Good visibility is possible in all directions. Roomy, comfortable cockpits for pilot and passenger are covered by a transparent sliding hatch providing protection from the elements and easy access.

The fuselage has an oval cross-section on which is imposed a semi-circular section for the cabin. The fuselage structure consists of bulkheads and longerons covered with plywood in which doors are provided to facilitate easy inspection of the interior. The steel tube engine mounting is attached to a fireproof bulkhead, and rubber buffers are fitted to prevent engine vibration from being transmitted to the rest of the plane. Oil tanks are located behind the first bulkhead, and an additional oil tank is placed in the coaming behind the pilot. In both cockpits adjustable seats are fitted with arm rests. The rear cockpit is fitted with detachable controls which can be easily disconnected by the pilot.

Wings are built up entirely of wood with plywood covering. The He 64 has the first application of automatic leading edge slots and trailing edge flaps to a single spar wing. Each outer panel is attached to the central portion by means of bolts. The ability to fold the wings back easily and quickly has been achieved by the operation of a single lever, which allows the wings to be folded in 50 seconds. Automatic slots are coupled to the trailing flaps, and by the use of these devices low landing speed and steep climbing angle have been obtained.



Outlines of the Heinkel He 64

A maximum lift coefficient of about 1.5 was achieved by several pilots during the technical tests for the 'Round Europe Flight in the He 64 airplanes. From wind tunnel tests a maximum lift coefficient of about 1.25 was predicted, and the increase appeared to be due to the slipstream effect.

Construction of the tail unit is similar to that of the main wing. Controls are operated by means of the conventional stick and rudder bar.

The undercarriage is braced by streamline tubes, insuring quick interchangeability. A combined compressed air-oleo shock absorber unit has been incorporated and the wheels are fitted with brakes operated by a hand lever. A rubber-spring tail skid is provided.

Besides the slotted wing, which insures additional safety in itself, due to the slow landing speed, the plane is equipped with such safety devices as fire extinguisher, kapok life preservers, parachutes, first aid kit and safety belts. No special tools are required for repair work, and spare parts are supplied ready for installation without individual fitting.

The machine can be fitted with the Argus engine of 150 horsepower, Gipsy III, or Hirth. Machines of this type used in the European flight were fitted with the new Argus As. 8R engine of 160 horsepower. The fuel supply is effected by engine-driven pumps.

The Argus As. 8R is a compact four-cylinder inverted in-line air-cooled engine delivering 160 horsepower at 2400 r.p.m. The bore and stroke are 4.75 inches by 5.5 inches and its weight is 265 pounds. Cylinders have drop-forged barrels of alloy steel with integral fins. Heads are cast aluminum and have valve seats and guides of bronze. The supercharger is of the Roots blower type, the Argus company having specialized in the development of this type in Germany.

The following data and performances relate to the actual figures officially recorded in the 1932 European contest:

Specifications

Wing span	32.2 feet
Length over all	27.3 feet
Height	6.75 feet
Wing area	155 square feet
Weight empty	990 pounds
Weight of passenger and pilot	352 lbs.
Weight of oil for three hours	33 pounds
Weight of fuel for three hours	209 pounds
Weight of luggage and parachute	66 lbs.
Total load	660 pounds
Permissible flying weight	1650 pounds
Wing loading	10.7 pounds per sq. foot
Power loading	11 pounds per horsepower
Maximum speed	152.5 miles per hour
Landing speed	32.5 miles per hour
Climb to 3280 feet	4 minutes
Range	656 miles

. AERONAUTICAL INDUSTRY .

Aeronautical Chamber Elects Officers

THOMAS A. MORGAN, president of the Curtiss-Wright Corp. and North American Aviation, Inc., was elected president of the Aeronautical Chamber of Commerce of America last month. Charles L. Lawrance was chosen treasurer, and Charles L. Barndt of Great Lakes Corp., secretary.

The Board of Governors of the Chamber also elected an executive committee of seven. These members are: Clayton J. Brukner, president, Waco Aircraft Co.; Capt. Thomas B. Doe, president of Eastern Air Transport, Inc.; Comdr. Jerome C. Hunsaker, vice president of Goodyear-Zeppelin Corp.; Mr. Lawrance; Lester D. Seymour, president of American Airways, Inc.; George S. Wheat, vice president of United Aircraft and Transport Corp. and United Air Lines, and Mr. Morgan.

Air Races at Miami

ALTON SHERMAN was awarded the Curtiss Trophy, and Roy Liggett received the Col. E. H. R. Green Cup as a result of winning speed competitions at the Fifth Annual Miami All-American Air Races at Miami, Fla., last month. James Wedell made the fastest time at the meet in the free-for-all, any displacement, with a speed of 205.295 miles per hour. Another feature event, the Florida Year-Round Clubs Handicap Race for sportsmen pilots from Daytona Beach to Miami, was won by J. Heron Crossman. Maneuvers by military planes and a visit by the *Akron* were other features of the meet.

First-, second- and third-place winners of some of the more important races included the following:

Free-for-all race, any displacement, James Wedell, Roy Liggett, John Livingston.

Sportsman pilot race for Texaco Trophy, free-for-all, Eric Wood, B. Stengall, O. Lazenby.

Curtiss Trophy Race, 800 cu. in., cabin, Alton Sherman, A. Carnahan, N. McCray.

Race for open or closed airplanes, 800 cu. in., Doug Davis, A. Davis, Alton Sherman.

Race for open planes, 800 cu. in., William Rausch, A. Davis, J. Musleh.

Sportsman pilot race, 800 cu. in., Ben Stengall, J. Start, Eugene Detmer.

Col. Green Cup Race, 500 cu. in., free-for-all, Roy Liggett, John Livingston, S. J. Wittman.

Sportsman pilot race for Cleveland Pneumatic Tool Trophy, 500 cu. in., Henry Little, J. Wright, William Rausch.

Race for airplanes, 450 cu. in., Jack Morris, John Livingston, Henry Little.

Race for airplanes, 200 cu. in., Art Davis, Karl Voelter, L. Lewis.

Florida Year-Round Clubs Handicap, J. Heron Crossman, Raoul Cote, Edgar Woodhams.

Women's race, Betty Lund, Helen McCloskey, Helen Ritchie.

COMING AERONAUTICAL EVENTS

February 22. Air carnival and aircraft show at Floyd Bennett Field, Brooklyn, N. Y., for the benefit of the welfare fund of the Early Birds.

June 1-Nov. 1. Century of Progress Exposition at Chicago, Ill.

June 11. International airplane contest at Angers, France, under the auspices of the Aero Club of the West and the Aero Club of France.

June 26-30. Annual meeting of the American Society for Testing Materials at The Stevens, Chicago, Ill.

July 4. Dedication of American Legion Dale Jackson Airport at Faribault, Minn.

Sept. 9-10. Dedication anniversary program, including air races and aerial demonstrations, at Indianapolis (Ind.) Municipal Airport.

Davison Heads History Museum

F. TRUBEE DAVISON, Assistant Secretary of War for Aviation, last month was elected president of the American Museum of National History, located in New York. After March 4 he will devote his entire time to his new position.

Institute of Aeronautical Sciences

ORVILLE WRIGHT has been elected to, and has accepted, the first honorary fellowship of the Institute of the Aeronautical Sciences. Only one honorary fellow is elected by the organization each year.

The Institute announced last month the names of over 300 founder members who have assisted in forming the new organization. The first annual meeting and founders' day program was held January 26 at Columbia University, when two lectures by Prof. Auguste Piccard were scheduled as features of the day.

No Aircraft Show for 1933 in Detroit

A SUGGESTION that an aircraft show be held this year in Detroit has been formally withdrawn by the Detroit Board of Commerce, according to a recent report. For the last five consecutive years the major aircraft show has been held in Detroit.

Pilots Greatly Outnumber Planes

A TOTAL of 18,594 pilots and 7,330 aircraft held active Department of Commerce licenses on January 1, according to an announcement by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. On January 1, 1932, there were 17,739 licensed pilots and 7,553 licensed aircraft. The total number of aircraft, licensed and unlicensed, of which the Branch had record on January 1, 1933, was 10,324.

Among the 18,594 persons holding pilots' licenses as of January 1, 1933, there were 7,044 of the transport grade, 1,224 limited commercial, 29 industrial pilots and 10,297 licensed in the private classification. The licensed pilots included 588 women, whose licenses were divided as follows: Transport, 57; limited commercial, 43; industrial, 1; private, 486, and autogiro, 1.

Leading the states in number of aircraft, licensed and unlicensed, was California with 1,134. New York was second with 1,095 and Illinois third with 613. Considering licensed aircraft only, California led with 921; New York followed with 909 and Pennsylvania was third with 472. The greatest number of unlicensed aircraft was in California, where there were 213; while New York had the next greatest number, 186, and Michigan was third with 160.

In number of licensed pilots, California led with 3,575; New York was second with 1,808 and Illinois third with 1,146.

The study also included gliders and glider pilots. It was found that the number of licensed gliders was 79, and unlicensed gliders, 1,282, making a total of 1,361. Licensed glider pilots numbered 209. The greatest number of gliders in a single state was in California, where there were 229. New York was second with 137 and Michigan third with 121. California also led in number of licensed glider pilots with 50, while New York had 27 and Ohio was third with 24.

New Orleans Air Races Postponed

THE AIR RACES and aviation meet originally scheduled to be held in New Orleans February 28 to March 4 this year to dedicate the Shushan Airport have been postponed until a later date. Due to an unforeseen delay in the completion of the airport, on which $1,000,000 construction has already been done, the dedication ceremonies have been put off until the airport is completed. Officials expect to open Shushan Airport some time this summer, the date to be announced later.

New Waco plane used as a flying laboratory by a Texas Company representative

Air Commerce Violations Number 222

THE AERONAUTICS BRANCH of the Department of Commerce dealt with 222 violations of the Air Commerce Regulations during the fourth quarter of 1932, according to Gilbert G. Budwig, Director of Air Regulation.

Violations of the provision of the Air Commerce Regulations pertaining to low flying, numbering 35, led the list of specific offenses. Other specific violations were: Acrobatics, 29; licensed aircraft flown by unlicensed pilots, 24; flying at night without position lights, 14; dual controls connected during passenger flights, 7. The miscellaneous offenses numbered 113. Of the total number of violations, 8 are still pending.

During the quarter, the Aeronautics Branch collected civil penalties in the amount of $320, of which $75 applied to penalties assessed during this period, the remaining $245 applying to penalties previously imposed. Civil penalties were assessed against 20 persons during the last quarter of the year, and 26 reprimands, 87 suspensions, 14 revocations and 6 denials of licenses were imposed for violations. In 69 cases evidence was produced which justified dismissal of the charges.

Pratt & Whitney Builds 5000th Wasp

COMPLETION of the 5000th Wasp engine has been announced by the Pratt & Whitney Aircraft Co. of Hartford, Conn. The engine was delivered to the Navy, which also received the first Wasp. An annual average of 1000 Wasps has been constructed by the company during the last five years. During that time the Wasp's horsepower has been increased from 400 to 550, and its specific weight has been lowered from approximately two pounds per horsepower to about 1.3 pounds per horsepower.

Schoonmaker Heads Aviation Committee

J. M. SCHOONMAKER, JR., president of the General Aviation and the General Aviation Manufacturing corporations, has been elected chairman of the Aviation Committee of the Baltimore Association of Commerce. He succeeds Glenn L. Martin, president of the Glenn L. Martin Co., who has become a director of the Industrial Corp. of Baltimore.

Sales Representative Receives Plane

THE TEXAS CO. has presented an especially equipped Waco airplane as a flying laboratory to Hal Henning, representative of the company in the central and eastern states.

Miles Flown by American Airmen

MORE THAN a billion miles have been flown by American airmen of record with the Aeronautics Branch, Department of Commerce. From flying time reported as having been accumulated by Federally licensed pilots, it was estimated that these aviators had flown approximately 1,054,000,000 miles. Flying by those who were carried as transport pilots at the time of the study accounted for approximately eleven-twelfths of the total. The remainder was credited to private, limited commercial and industrial pilots, in that order.

DIGEST OF RECENT EVENTS

Italian Pilot Sets Height Mark

RENATO DONATI, Italian civilian pilot, established an official world's altitude record for tourist planes, reaching a height of 9282 meters. This flight was made after his claim for the setting of a mark of 9500 meters earlier in the month had been rejected. (Dec. 30.)

Oakland Air Program

A NEW YEAR'S DAY AIR SHOW was given at Oakland (Calif.) Municipal Airport under the auspices of the Merchant's Exchange. (Jan. 1.)

Commercial Passenger Record Made

A UNITED AIR LINES trimotor landed at Newark Airport, N. J., in 16 hours and 16 minutes of flying time after it had left Los Angeles, Calif. The trip was reported to establish a speed record for commercial passenger airplanes in the transcontinental service. (Jan. 10.)

Flight to New Zealand Completed

SIR CHARLES KINGSFORD-SMITH landed at New Plymouth, North Island, New Zealand, completing his third flight from Australia to New Zealand. He flew the 1500-mile distance in his remodeled Fokker, *Southern Cross.* (Jan. 11.)

"Akron" Ends Training Trip

THE NAVAL AIRSHIP *Akron* returned to the Naval Air Station at Lakehurst, N. J., following an eight-day absence, during which the ship visited Cuba and Miami, Fla. The purpose of the flight was the inspection of mooring mast sites at the Cuban naval station at Guantanamo and the warm-weather testing of planes and equipment. (Jan. 11.)

Nicaraguan Force Returns

THE AVIATION FORCE of the Second Brigade, U. S. Marine Corps, arrived at the Anacostia (D. C.) Naval Air Station after a 2500-mile flight from Managua, Nicaragua. Twenty-two planes, carrying fifty-nine men, made the trip. (Jan. 12.)

Express Planes Make Two Records

WESTBOUND and eastbound transcontinental speed records for commercial planes between Los Angeles, Calif., and New York City were established by Lockheed airplanes of the Air Express Corp. The record westbound trip was made in 17 hours, 20 minutes and the eastbound flight in 14 hours. (Jan. 14 and 16.)

Mermoz Flies South Atlantic

AFTER a fourteen-hour flight of 1962 miles across the South Atlantic from St. Louis, Senegal, Africa, Jean Mermoz, French flier, landed his trimotored monoplane, *Arc-en-Ciel* (Rainbow), at Natal, Brazil. The plane left Istres, France, January 12, and on its transoceanic flight carried a load of about 31,305 pounds. Six passengers, including René Couzinet, builder of the plane, accompanied Mermoz on the flight, which was made primarily to test the ship's efficiency for transoceanic air mail service. It was Mermoz's second flight across the South Atlantic. (Jan. 16.)

Mermoz Ends Record Trip

JEAN MERMOZ landed his Couzinet 70, powered with three 650-h.p. Hispano-Suiza engines, at Buenos Aires, Argentina. His flying time from Istres, France, was 54 hours, 33 minutes. (Jan. 22.)

Lockheed with 200-Mile Cruising Speed

THE LOCKHEED AIRCRAFT CORP. of Burbank, Calif., has announced that effective immediately it is ready to deliver its 1933 Orion model with a cruising speed of 200 miles an hour.

This speed makes possible the carrying of passengers 2446 miles from Los Angeles to New York in a flying time of 12 hours and 23 minutes; a business trip of 345 miles from Los Angeles to San Francisco in 1 hour and 42 minutes; the crossing of the 577 miles from Los Angeles to Salt Lake City in 2 hours and 53 minutes; the 188 miles from New York to Boston in 56 minutes; the 711 miles from New York to Chicago in 3 hours and 33 minutes, and brings New York and Washington, D. C., within 1 hour and 2 minutes of each other.

The increase in speed over the present model is gained by installing the new Pratt & Whitney S1D1 Wasp, improving the wing fillets, redesigning the tail assembly, putting the landing lights inside the leading edge of the wing and various other refinements developed by the Lockheed engineering department. The pay load with a 750-mile cruising range remains at 1172 pounds. Delivery date is approximately 40 days from the time the order is placed with the factory.

Stinson Reports Encouraging Outlook

THE 1933 OUTLOOK for the Stinson Aircraft Corp. is better than at any time during the past two years, according to officials of that company.

"We are now employing more people than at any time during the past two years," said B. D. DeWeese, vice president and general manager of that corporation, "and while a part of this increase is due to a shorter work week and our 'share-a-job' plan, the other side of it is that we have more work to do than is usual during the winter months.

"We are pushing hard to deliver Model 'U' trimotor transports to operators both here and abroad and also have a large overhauling and rebuilding program under way for operators of our equipment who have decided that we can do this work better and at less cost than they can do it, particularly when considerable revamping is to be done for two-way radio, dual flying instruments and similar features which had best be inbuilt.

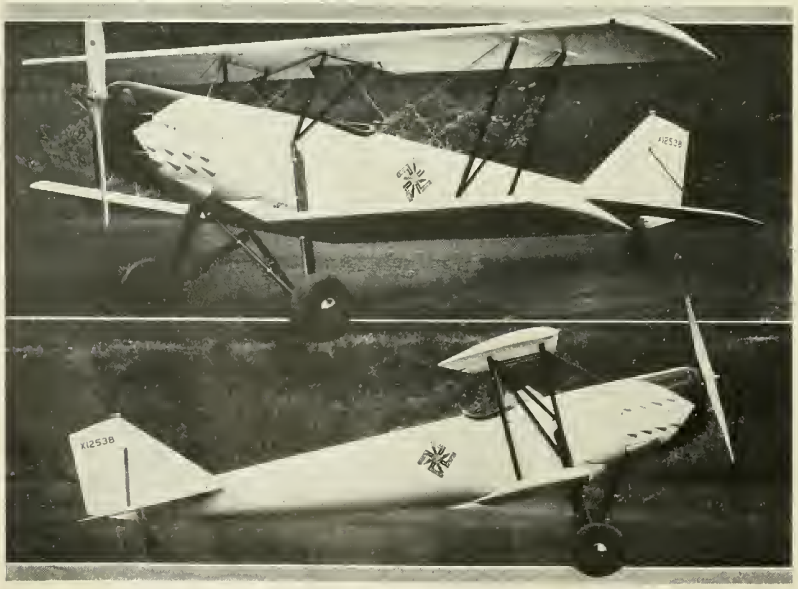
"Our single-motored plane business is better than at any time during the past six months, and considerable export business is developing in this class. We look for improved business from now on."

Detroit Aircraft to Be Reorganized

A NEW COMPANY will be formed to purchase at a judicial sale the assets of the Detroit Aircraft Corp., according to a decision by the stockholders. The new firm will take the name of the old company, now in receivership, and will have an authorized capital stock of 200,000 shares of $1 par value. These shares will be offered in the ratio of one share for every ten shares of old stock.

Fairchild Aviation Moves Headquarters

OFFICES of Fairchild Aviation Corp., including the aerial camera manufacturing plant and aerial surveys laboratory, have moved into new and larger quarters at 62-10 Woodside Avenue, Woodside, N. Y. Companies directly involved in the change are Fairchild Aerial Camera Corp., Fairchild Airplane Sales Corp. and Fairchild Aerial Surveys, Inc.



The Longren side-by-side Model NL-13 all-metal biplane

Boeing Describes 1932 Progress

ANOTHER YEAR of accomplishment was reported by the Boeing Airplane Co. of Seattle, Wash., in 1932, when it produced a total of 185 planes and set new standards for both military and commercial design and construction. Outstanding new types produced in the year included the all-metal, low-wing, twin-engined, Hornet-powered Army bomber; the all-metal, low-wing, single-seater, Wasp-powered Army pursuit plane and the all-metal, low-wing, twin-engined, Wasp-powered transport. The year closed with the company about to bring out the first of its transports, completing its order of seven bombers for the Army Air Corps and turning out carrier fighters for the Navy. Three of its all-metal, low-wing pursuit planes are being flown by the Army Air Corps.

Since its organization in 1916 the company has produced approximately 1800 planes of fifty-three different types, including training planes, observation planes, attack planes, pursuits, bombers, flying boats, seaplanes, mail and mail-passenger planes and large multi-engined transports.

Campbell Chosen Sales-Service Manager

RALPH S. DAMON, president of Curtiss-Wright Airplane Co. of St. Louis, Mo., last month announced the appointment of E. K. (Rusty) Campbell as manager of sales and service, transport division, of the Curtiss-Wright Airplane Co. Mr. Campbell's new work will consist chiefly of supervising liaison between the Curtiss-Wright factory and customer transport airlines on the new fifteen-passenger Cyclone-powered twin-motored 1933 Condors, of which nine have been sold to Eastern Air Transport and American Airways. He will make his headquarters at Robertson, Mo.

Autogiro Firm Changes Name

PITCAIRN AUTOGIRO CO. officially became the name of the manufacturer of Pitcairn autogiros January 11. The company was formerly the Autogiro Co. of America and Pitcairn Aircraft, Inc.

Airplane Speed Predictions

A MEMORANDUM covering a method that may be used by designers for predicting airplane high speeds on the basis of design data has been distributed to manufacturers by the Aeronautics Branch of the Department of Commerce. The material forms an addition to the series of memoranda on the general topic of design load determination. Based on a study of seventy-seven airplanes, the memorandum discusses the method in technical language and explains formulas used.

(Continued on following page)

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(Continued from preceding page)

Special Stearman Model 80 Ordered

SALE of a new high-speed Model 80 Stearman that is being especially designed and equipped for John L. Vette, Jr., of Oak Park, Ill., has been announced by J. E. Schaefer, vice president and general manager of Stearman Aircraft Co., Wichita, Kans.

The new Stearman will be powered with a Pratt & Whitney supercharged Wasp Junior, which develops 420 h.p. at 2200 r.p.m. A sea-level cruising speed of 150 m.p.h., with a cruising range of 690 miles, is specified. The top speed will be 175 m.p.h., and the climb at sea level will be 1500 feet per minute, with a service ceiling of 20,000 feet.

Chinese Order Fleet Training Ships

RECEIPT of a repeat order from the Central Aviation Bureau of the Chinese Government for fifteen Model 10 Fleet training airplanes has been reported by Consolidated Aircraft Corp., Buffalo, N. Y. This is the second order for fifteen Fleets received from the Chinese Government since June of last year. The value of the order is approximately $60,000, and shipments were scheduled to be started early last month.

Pratt & Whitney Engineer Promoted

CHARLES H. CHATFIELD, aeronautical engineer for Pratt & Whitney Aircraft Co., has been made assistant director of research in the research division of United Aircraft & Transport Corp., of which Pratt & Whitney is a subsidiary. Mr. Chatfield was formerly chief airplane engineer for the Wright Aeronautical Corp. and an associate professor of aeronautics at Massachusetts Institute of Technology. He is co-author of "The Airplane and Its Engine."

Rubbercraft Official Appointed

F. B. BARLOW, for the past three years aeronautics department eastern representative for Goodyear Tire & Rubber Co., and previous to that with Air Associates, Inc., has resigned to accept the position of sales manager for Rubbercraft Corp., New Haven, Conn., manufacturers of airplane flotation gear equipment, life rafts and other rubberized fabric products.

TRADE LITERATURE

Index to Standards

THE AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia, Pa., has issued its 1932 "Index to A. S. T. M. Standards and Tentative Standards." This book contains a guide to 441 standards and 226 tentative standards of the society as of October, 1932. Full descriptions of these standards appear in other publications of the organization, to which the Index refers.

Folder on A-C. Welders

CONSTRUCTION, operation and distinctive features of the Westinghouse 100-ampere FlexArc A-C. Welder are described in a new leaflet published by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Rated at 220-440 volts, 50-60 cycles, single phase, with current range of four to 125 amperes, this welder is described as meeting the demand for the economical arc welding of thin-gauge material such as that encountered in aircraft fabrication. work.

A twenty-page illustrated leaflet describing the features, characteristics and applications of other Westinghouse FlexArc welders has been published by the company. The booklet is entitled "Westinghouse Arc Welding Data Bulletin No. 16."

NEW AERONAUTICAL BOOKS

SIMPLE AERODYNAMICS AND THE AIRPLANE

By COL. C. C. CARTER

THE Fourth Revised Edition of "Simple Aerodynamics and the Airplane," of which Lieut. Charles N. Monteith prepared the first two editions, brings up to date a textbook in elementary aerodynamics for technical institutions. Written by a professor of natural and experimental philosophy at the United States Military Academy, the book is designed to be not highly technical but to equip the student with the fundamental principles of aerodynamics.

Following an introductory chapter regarding various types of airplanes is a series of discussions regarding airplane parts and their relation to aerodynamics, such as airfoils, propellers, fuselage, landing gear, control surfaces, materials and construction. The complete airplane also is considered, and there is a chapter on avigation as well as another on equipment, including parachutes, instruments, electrical equipment and radio, cameras and accessories. For the special benefit of the cadets, whom the author had particularly in mind in preparing this edition, a chapter on military airplanes, plentifully illustrated with photographs of various types, is included.

Among material in the appendix is a brief description of the autogiro, nomogram for propellers, vector diagram for an airplane, characteristic curves of airfoils, aerodynamic equations, aerodynamic problems to be solved and a nomenclature for aeronautics.

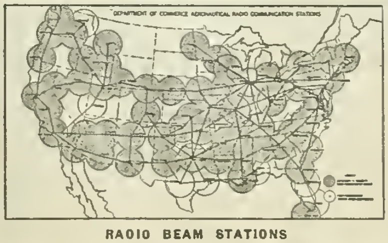
HORIZONS

By NORMAN BEL GEDDES

PICTORIALLY, by means of nearly 300 line and halftone illustrations in its 300 pages, "Horizons" depicts in an inspiring manner the design trends in many unrelated fields of endeavor of the not-far-distant future, as Mr. Geddes visualizes it.

One of the fourteen chapters of the book, entitled "By Air Tomorrow," relates principally to airport design, and in regard to this subject Mr. Geddes shows a most practical understanding of the problems involved. Detailed plans also are given for a tailless giant seaplane air liner, powered with twenty-six 1900-horsepower engines, and with a wing spread of 528 feet. The plane is designed to carry 606 persons, 451 passengers and a crew of 155.

Other chapters in the book will appeal to those interested in aeronautics, as they consider the streamlining of ocean liners, automobiles, railway locomotives and passenger coaches. The book as a whole deals principally with Mr. Geddes' beliefs, theories, opinions and experiences with regard to designing for industry.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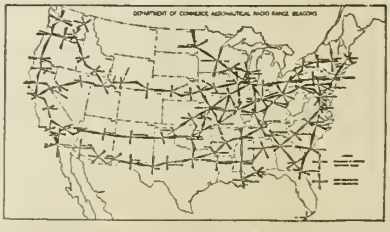

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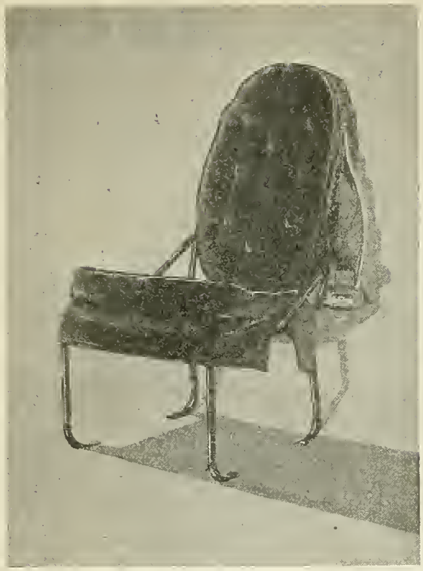

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• FOREIGN NEWS IN BRIEF •

MOUNT EVEREST FLIGHT EXPEDITION

AIR COMMODORE P. F. M. FELLOWES is reported to have been chosen as the leader of the expedition which will attempt a flight over Mount Everest in the Himalayas this year. Flying tests of the two Westland airplanes bought for the expedition were scheduled to begin last month. The Marquis of Clydesdale will pilot one of the planes in the attempt to fly over the mountain, the highest in the world.

Each airplane is powered with a single Bristol Pegasus supercharged air-cooled engine exactly similar to the one in the airplane which recently established a new world's altitude record. All military equipment and fittings such as wheel fairings and brakes are being removed to save weight in order to attain the 34,000-foot ceiling required for the Mount Everest flight. One of the planes is named the *Houston-Westland,* in recognition of Lady Houston's contributions to the enterprise. The sister ship, a standard Wallace type biplane, is of the kind employed for general purpose flying in the Royal Air Force but modified to meet conditions of the flight. Equipment to be carried will include ninety gallons of gasoline, oxygen-breathing and heating apparatus, electrically operated camera and moving picture camera.

AUSTRALASIA

THE TASMANIAN GLIDER CLUB established a new duration record for Tasmania at White Hills when B. F. Wilmot remained in the air 2½ hours. A new glider, the *Dragon-fly 2*, has been placed in commission by the club.

FIJI AIRWAYS LTD. has been formed with the object of conducting an inter-island service in Fiji. The government of Fiji has given the proposed service encouragement, and it is proposed to vote a subsidy of £1,500 per annum for three years. Guinea Airways Ltd. have decided to extend financial support to the venture, and the fleet to be used will be Genairco planes, which are made in Australia.

THE PERTH CITY COUNCIL recently made available a tract of land of approximately eighty acres at City Beach for use as an airdrome by gliding clubs.

THE CRIMINAL INVESTIGATION BRANCH has made arrangements with two Sydney flying companies for the hire of machines when required. The companies have agreed to take detectives to "jobs" in any part of the state.

AFTER nine months' work, eight natives were arrested for murder in New Guinea and brought in by air. Early land patrols were forced to return, but an air reconnaissance not only showed the site of the villages where it was believed the murderers were being sheltered, but also revealed topographical details which were of the greatest value to the search party that was successful.

THE PERTH AERIAL DERBY of twenty-five miles was won by Captain Snook in a Wapiti plane.

AT PORTS along the coast where airplanes are held in reserve for W. A. Airways Ltd. in Western Australia, a flying doctor will be stationed, under a plan proposed by the airline. Planes will have accommodation for stretcher cases, and with special equipment to deal with various illness and accident patients, the doctors can quickly reach remote sections.

CANADA

THE FAST four-day trans-Atlantic mail service placed in operation by the Canadian Government during the Imperial Conference last summer may become a permanent part of the mail service in the Dominion, according to conferences recently held in Ottawa among various government departments. The service took mail from and delivered mail to the *Empress of Britain* while inward or outward bound in the Straits of Belle Isle, saving more than forty-eight hours in the handling of European mail.

BARKER FIELD, which is located two miles north of Toronto, Ont., has been designated as the only customs airport serving Toronto.

CUBA

OPENING of a new air service between Batabano, Cuba, and the Isle of Pines has been announced by the Aeronautical Corp. of Cuba. The service is daily both ways, the air trip being only one hour. The only alternative means of travel is an eight-hour boat trip. Four-passenger flying boats were in use on the airline but were scheduled to be replaced last month by cabin ships with pontoons.

O. B. Santamaria is president of the airline, with J. R. Villalon as general manager and T. L. Kennedy as chief pilot and head of operations.

FRANCE

THE INTENDED MERGER of the Air-Union and Farman Lines early this year was announced recently. The two companies will be combined under the name of Air-Union, with the existing services being continued as previously. The airlines operate between Paris and London, Marseille, Amsterdam, Berlin and other north European cities.

GERMANY

BRANCHES of the National Association for Air Protection, of Berlin, have been formed at Stuttgart and Mannheim. The two chief aims of the organization are to create a public opinion supporting an active governmental program for defense against air raids and to educate the people in self-protection measures against war air raids.

AN AIRPORT is to be established at Cuxhaven at the mouth of the Elbe River. This will facilitate connections with the interior and with the North Sea bathing resorts for travelers arriving on steamers bound for Hamburg.

THE CIVIL AERONAUTICS SUBSIDY for 1932 amounted to $10,443,450, an increase of about $166,740 above the estimates of the preceding year.

THE "Luftfahrt Museum" has been opened at Johannisthal, Germany's first airport. Among the historical exhibits is a biplane of the type used by Orville Wright in his first flight at Tempelhof in 1909.

NATIONAL standard colors for the identification of the operating parts of airplane equipment are being used by the German airplane industry, according to a letter received by the American Standards Association from the Standards Committee on Aeronautics, working under the procedure of the German national standardizing body, Deutscher Normenausschuss. The standard colors are considered to be an important safety device because of the great number of pilots who frequently change planes, so that familiarity with the location of controls and equipment is important.

The standards, which also are being accepted by other European countries, are as follows: Red, fire extinguishers, fire alarms, short-circuit switches; green, temperature regulator for cooling water; yellow, gas levers; brown, temperature regulator for lubricating oil; black, ignition levers.

(Continued on following page)

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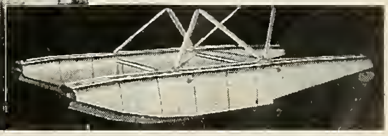
Below:—EDO Float installation complete, with water rudders, ready to install on a land plane.



(Continued from preceding page)

GREAT BRITAIN

C. H. LOWE WYLDE, designer of the ultra-light six-horsepower airplanes which made their first public appearance at the London Air Park, Feltham, December 27, in a demonstration of pylon racing, the following day reached an altitude of 4,300 feet in one of the small machines. At that height the gasoline supply became exhausted. The plane carried one gallon of gasoline and a load of 45 pounds per horsepower. Rate of climb was 120 feet per minute.

Maximum speed of these planes is 45 miles per hour, and the landing speed is about 18 m.p.h. The power plant is a motorcycle engine. In the pylon racing the planes were flown at heights of not over 40 feet. They have a small gliding angle, giving a gliding radius reported as more than twice that of the average light aircraft. Development experiments are proceeding with the assistance of the technical staff of National Flying Services, Ltd.

CAPT. JAMES A. MOLLISON and his wife, Amy Johnson, are reported to be planning a joint two-way flight across the North Atlantic. The plane chosen for the flight is said to be a two-engine plane, capable of carrying seven passengers, with a cruising speed of over 100 m.p.h. and a range of 3,000 miles. They plan to begin the trip following a proposed flight by Captain Mollison across the South Atlantic this spring.

A ROLLS-ROYCE Condor twelve-cylinder water-cooled engine has been converted from a gasoline engine to one that will burn heavy oil. The charge is fired in each cylinder by simple compression of a mixture of oil spray and air.

At maximum output the compression-ignition Condor delivers 500 h.p. as against 650 h.p. of the gasoline-burning engine from which it was developed. Together with starter and the essential accessory equipment, it weighs 1,504 pounds, or three pounds a horsepower. Normal output is 480 h.p. at 1900 r.p.m. Compression ratio in the cylinders is 12½ to 1, and the greatest pressure reached at the moment of combustion is 800 pounds to the square inch.

AVRO TYPE 621 training planes have been chosen to succeed the Avro 504 machines as the standard training aircraft of the Royal Air Force. Constructed entirely of metal, except for the fabric coverings of wings and fuselage, the Type 621 is powered with a 150-h.p. Mongoose air-cooled radial engine. If more power is needed, a 215-h.p. Lynx engine may be used. With this engine, the Type 621 reaches a maximum speed of 116 m.p.h., cruises at 100 miles an hour and can remain aloft for three hours on one fuel load. Its ceiling is 20,600 feet, and it climbs to 15,000 feet in 26 minutes. Fully loaded, it weighs just over one ton.

THE "micro ray" wireless service, employing the shortest wave length of any radio station in the world, will be used to announce on either side of the English Channel the arrival and departure of aircraft which do not carry wireless signaling equipment on board, and for routine service messages from one air station to the other. At each end teleprinters will send out and take down the messages.

The wave length of this installation will be about 15 centimeters (six inches). Transmitting and receiving aerials are less than one inch long. The process originates in the production in a special generating tube of "micro rays," which oscillate at a rate of approximately two thousand million times a second. These oscillations are led to the transmitting aerial and are then concentrated into a fine but intense pencil of rays, which are subsequently thrown into space from a circular reflector about ten feet in diameter. This reflector is focused onto a similar reflector at the receiving station.

EFFICIENT CONTROL of radio communications between ground stations and airliners operating on the Imperial Airways routes is sought in the appointment of a special "signals adviser," who will be stationed in Cairo. The post is being filled temporarily by Flight Lieutenant Durrant, civil aviation signals officer at the Air Ministry. Practically all wireless communications in North Africa, India and Iraq has been controlled by the Royal Air Force, but recent developments of the British air routes make civilian control desirable. Uniformity will be sought first on the India route. After that the line between Cairo and Cape Town will receive attention.

The Armstrong Whitworth Atalanta monoplanes ordered for service along the African line are to be equipped with short-wave as well as medium-range wireless, and with direction-finding equipment. The short-wave installation has been adopted to surmount the difficulties of radio communication in areas like those bordering the equator in Africa, which are subject to severe electrical storms.

THE DE HAVILLAND DRAGON, a twin-engined biplane, made its first flights in public recently. Seating accommodation for six passengers, each of whom has an armchair adjustable to any desired position, is provided in the cabin. The pilot's cockpit is located in the nose of the fuselage.

Powered with two 130-h.p. Gipsy Major air-cooled engines, the airplane is controllable at all speeds with one or both engines running, and has an unusually low landing speed which, with the provision of wheel brakes, enables descent to be made in any field that can be used by a light airplane of the Moth type. In a recent test the Dragon reached a height of 142 feet at the end of a take-off run of 465 yards.

Maximum speed of the plane is 130 m.p.h., and normal cruising speed is about 112 m.p.h. Load carried, in addition to pilot and six passengers, is 279 pounds of luggage and fuel sufficient for 525 miles.

The plane has folding wings and a wide-track undercarriage. It is designed to fly easily with full load on the power of one engine alone.

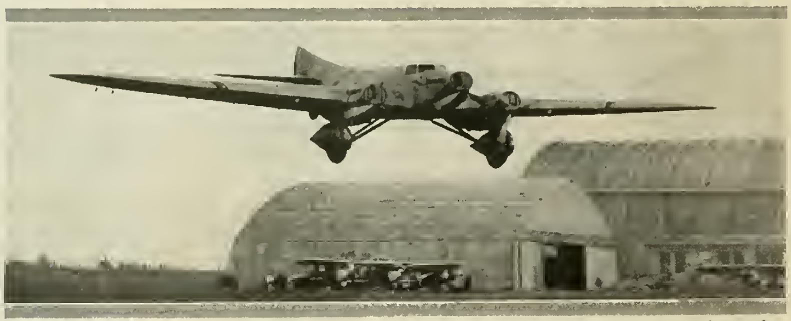
HOLLAND

AN AIR NAVIGATION ARRANGEMENT has been negotiated between the United States and the Netherlands. The agreement opens both countries to flight by aircraft of either nation, subject to certain restrictions.

ITALY

BACKED by the Air Ministry, the Young Fascists of Combat and the Royal Aero Club have organized a national body for the promotion of glider flying. Headquarters are located in each province in Italy.

(Continued on following page)



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Couzinet plane flown from France to Argentina by Jean Mermoz and a crew of six

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(Continued from preceding page)

MEXICO

APPLICATION has been officially filed by Federal Senator Carlos Garza Castro for a concession to operate a mail, passenger and express airway between Mexico City and Nuevo Laredo, on the American border, with stops at Queretaro City, San Luis Potosi City, Saltillo and Monterrey, according to the Aviation Section of the Ministry of Communications and Public Works.

THE JALISCO STATE GOVERNMENT has approved plans for the construction of a modern airport at Jocotepec, an important town on Lake Chapala. Expenses of the work will be borne by the state and municipal governments. The Jalisco state chief of military operations has ordered commanders of all military districts in the commonwealth to build landing fields in their jurisdictions. The work will be done by soldiers.

A PROPOSITION for manufacturing in Mexico the eleven planes that are necessary to complete the thirty-one required for the second air regiment of the Federal Army Aviation Service is under consideration by the Military Aviation Section of the Ministry of War and Marine. The planes would be of the Corsair and Douglas types. The plan calls for using the machinery and equipment of a private aircraft factory in Mexico City, which produced Corsair jobs for the first air regiment of the national army, to build the plane bodies. Engines and other parts would be imported.

FEDERAL TROOPS are at work conditioning the military and civil airport at Toluca, near Mexico City. The port has been out of service for some time because of the lack of funds by the state government to put it into condition. The state commander of military operations offered to provide soldiers to do the work in their spare time.

CONTRACTS for the aerial mapping of the west coast ports of Mazatlan and Salina Cruz have been made by the Ministry of Communications and Public Works with the Mexico Aerofoto Co., a new enterprise which recently took over the interests in Mexico of the Fairchild Aerial Survey Co.

A RADIO STATION, the function of which is to communicate with planes and to broadcast their movements, has been established at the Mexico City central civil airport by the Ministry of Communications and Public Works.

The Ministry has ordered the installation of direct telephonic service with meteorological stations in all Mexican airports as a means of affording pilots information concerning weather conditions obtaining along the routes they are flying. All airport chiefs have orders to prevent pilots or other aviators from taking off if bad weather is prevailing over regions their flight would traverse.

A LANDING FIELD has been constructed on the Primavera Hacienda, a sugar plantation, near Culiacan, Sinaloa state. The field, which was built by the hacienda's owners, is available for civil and military fliers and aviation firms.

AIR maps are to be made of all important cities and towns in Mexico, according to the Ministry of Communications and Public Works. These maps are being made by a corps of Ministry photographers from airplanes manned by Army pilots.

WORK has been started at the Federal Government aircraft shops in Mexico City for arming the thirty-one Corsair type planes which were constructed in Mexico for the second air regiment of the National Army Aviation Service, the Ministry of War and Marine has announced. Each plane is being equipped with two Lewis machine guns, two Vickers machine guns, which can be operated from the cabin, on the wings and two Standard bomb hurlers. All this equipment was purchased recently by the Federal Government in Los Angeles, Calif. Arrangements are being made for equipping the planes of each squadron commander of the regiment with radio sending and receiving sets.

ARRANGEMENTS were completed for the establishment last month of a school of civil aviation at Monterrey, Nuevo Leon state, near the American border. The school is to be under the auspices of the state and municipal governments, various Monterrey business organizations and the National Revolutionary Party. These organizations have assured the school an annual subsidy of 36,000 pesos upon condition that the institution graduate thirty-six pilots each year. Col. Roberto Fierro, of the Mexican army air service, who made a record non-stop flight from New York to Mexico City, has been named director of the school.

THE Federal Government proposes to establish within the next few years a number of flying schools that will correspond proportionately to the number of similar institutions in the United States, according to Gen. Juan F. Azcarate, former head of the aviation section of the Ministry of War and Marine and now chief of the Presidential staff. It is the Government's desire to increase the number of Army Aviation Corps reservists, he said, and plans are being made to establish aviation schools throughout the country.

BAPTISM of the first motorless plane to be demonstrated in Mexico was the feature of celebrations commemorating the fifteenth anniversary of the Mexican military air service. The craft was designed and built by Engineer Guillermo Villasana. It has a total weight of 91 kilograms. Its wing span is 12.5 meters, and the wing surface is 20.6 square meters.

UNDER orders issued by the Ministry of Communications and Public Works all aviation companies are obliged to observe the stipulation in their concessions that they build and maintain landing fields at towns where their planes make stops on routes they operate. Plans for such fields must be approved by the Ministry. Various airlines have arranged with the state and municipal officials for building landing fields at Matamoras, across the border from Brownsville, Tex., and at Ciudad Juarez, across from El Paso, Tex.

THE Mexican branch of Pan American Airways has announced that it will grant a discount of twenty-five per cent from the regular passenger fares to all Federal and State Government officials and Army and Navy officers, whether on official or private business, during 1933.

RUSSIA

THE RUSSIAN-SINKIANG BORDER became the western terminus of a new airline connecting Asia and Europe recently when the Eurasia Aviation Corp. inaugurated an air mail service between Peiping and the border. Covering 3,000 miles over China, Siberia and Russia, the air route is covered in four days.

IT IS REPORTED that construction of six semi-metallic dirigibles of 250,000 cubic meters' gas capacity was scheduled to be started last month by the Soviet Government under the supervision of General Umberto Nobile, Italian air explorer. The dirigibles will be organized as the Lenin Squadron and employed in military maneuvers. They also will be employed on aerial surveys, explorations, inspections, seed planting expeditions and war against agricultural parasites.

FOR the first time air travel to Russia from Germany will continue through the winter. Planes of the Berlin-Moscow air service will be equipped with combination landing gear, so that either skis or wheels may be used.

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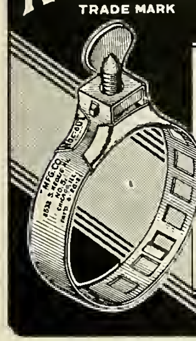

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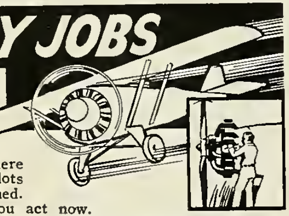

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AIR—HOT AND OTHERWISE

(*Continued from page* 15)

The navy is a laboratory in industry, science and sociology, it is a factor in diplomacy and a messenger of mercy when exceptional disaster smites any people or any portion of this suffering world. Nearly all its money is spent at home.

And of all the Naval Services, the Naval Bureau of Aeronautics is most vital, most important.

Whatever else may be done, one thing is essential—and it will cost the taxpayer no money, but, save him much, perhaps. That is the retention of Admiral Moffett as head of the Bureau of Aeronautics until such time as he retires from the Navy—which will be a sad day for the United States. If this fact is properly presented at Washington, he undoubtedly will be retained.

GRAND NATIONAL AIR RACING CIRCUIT

(*Continued from page* 19)

races all the pilots should have won a satisfactory amount of money.

There will be four or five ships that could win nearly every time. But if they did, then the slower ones would withdraw, and we would have no races. Here is a plan, under which the inherently faster ships will make the most money, as they should, but even the slower ships will make expenses.

Consider a four-day meet. On the first day each class starts with a racehorse start. The fastest ship usually wins first place, and so on down the line. On the second day each class starts off at so many seconds' interval between ships, which is arrived at by taking the finish time of the ships on the previous race. Thus the slowest ship starts first, the next slowest in second place, and so on to the fastest ship, which starts last. The first one to finish in this handicap race will be the winner, with prizes for the next three or four placing ships.

In this way, in every second race, we have absorbed the speed advantage of ships and made it more a case of piloting ability only. So you might say that one day it is a race between ships, the next day a race between pilots. Each ship will have to make a qualifying speed in each free-for-all in order to be eligible for the following handicap race—a certain percentage of its known top speed. This is to prevent the slowest ship from loafing around the course during the free-for-all in order to have an unfair start of

DESIGN
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DR. MICHAEL WATTER
Consulting Aeronautical Engineer
515 Madison Avenue - New York City

the faster ships on the handicap day.

This plan seems to solve the problem of providing enough financial sustenance to keep the slower ships in the races, which is a necessity. There have been handicaps before, but always they have been arrived at by involved mathematical computations that pleased nobody. By this plan, the ships themselves provide their own handicap. And as it is taken from the preceding race each time, it is not always the same handicap. If through some special circumstance, a ship receives too much or too little handicap, it will be for that race only. The next racehorse start event will provide a new handicap for the following free-for-all.

Air races tend to become a monotonous wheeling around pylons, and interest in them lags. Cliff Henderson suggests that in every race, let each contestant land once, taxi to a pit in front of the grandstand, refuel and take off again to complete the race. Even at a commercial airport people watch landings and take-offs. Give them landings and take-offs in the middle of a race and their interest will be increased 100 per cent. Furthermore, the skill of pilots will come far more into the picture. Landing to a mark, taxying the shortest possible distance and taking off again in the shortest time offers an opportunity for a demonstration of piloting skill that no plain race affords. Also, the non-paying crowd outside the airport will not be able to see this interesting part of the race at all—a further inducement for them to come inside.

As for who will put on this show, I suggest local committees in the various cities working under the direction of Cliff and Phil Henderson as Directors General to weld the whole together and supervise its operation. These are the only men who have had the experience necessary to get to first base with it. Despite the growling about Cliff last year, including my own, he remains the one man who ever has collected any large piece of change from the public and distributed it among racing pilots. For instance, in 1932 he flew over 16,000 miles around the country, promoting the various derbies which, with the exception of the Bendix, were not worth fifty cents to people who paid to see the National Air Races. Nevertheless, Cliff raised the money for them. If there are better men than the Hendersons to direct this racing circuit, where are they?

To the objection that the Hendersons already have enough to do to manage the National Air Races, I say that unless a National Racing Circuit is established, there soon will be nothing left to handle, for the way these races are headed now is down and out financially. One city will not support them generously enough to give the financial impetus desirable for the design and production of racing ships, irrespective of whether it's Cleveland or any other one city. And little air meets here and there will not supply the money, either. Put on a real show that the public will flock to see, and move it around where the public lives.

What I have offered here is merely an idea—I want you six readers, especially racing pilots, to add your suggestions. Surely, if we all put our minds to this matter we shall arrive at some conclusions on which we can build and experiment. What we have now isn't going to work much longer. It isn't going to begin to give pilots and designers the financial support they need if they are to progress with design, and still continue eating, which is a necessity.

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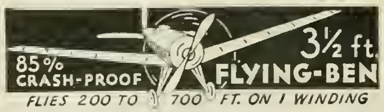

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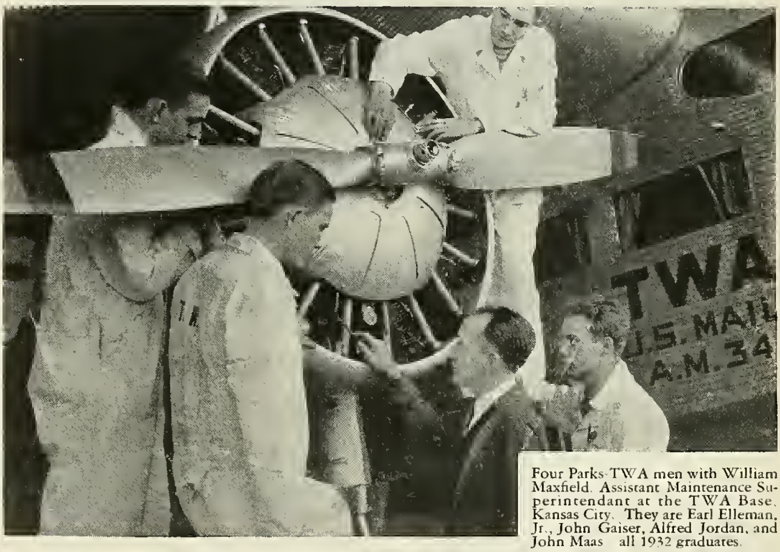

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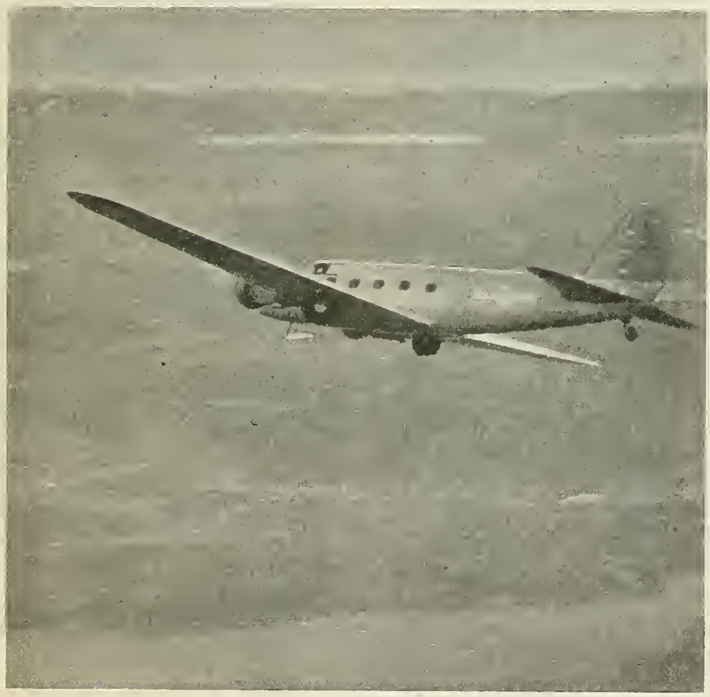

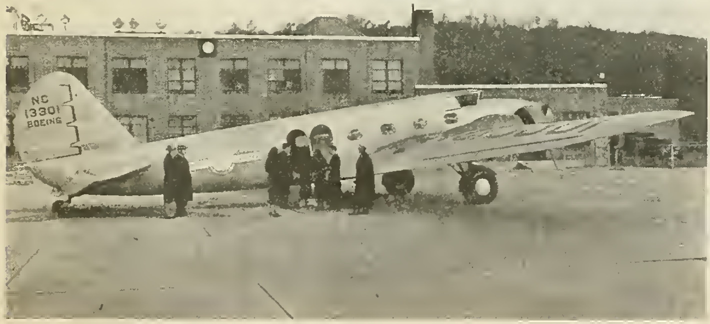

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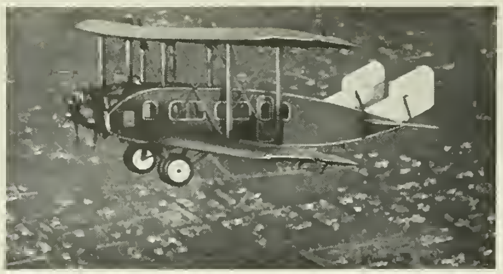
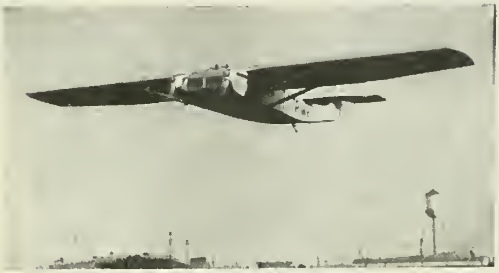


1920—The RB-1, first airfoil fuselage center section.

1924—The RB-2, first air freighter. Corrugated metal construction.



1927—The CB-16, first multi-engine design with retractable landing gear.

1930—The UB-20, first American transport with flat stressed skin construction.

The Design Basis of the Burnelli Type Airplane

THE effect of merging the required frontal drag areas of the conventional type fuselage with side multi-engine installations into unified body or drag frontal area greatly increases the useful body cross sectional area, hence *cabin volume capacity,* which is about doubled.

Forming the wide body cross sectional area into airfoil contour causes it to generate lift in excess of the wing area it replaces, which, for the 1200 horsepower type, equals 180 square feet. This lift effect was proven by thorough wind tunnel research and in full flight. Lift of the body therefore reduces its parasite drag area per horsepower in proportion to the lift and equivalent frontal area of a normal thickness airfoil. The extent of this favorable aerodynamic influence *reduces the non-lifting drag increment of the body about 50%,* or, for a body 5′ high by 12′ wide (60 sq. ft. frontal area) to 2½′ by 12′ (30 sq. ft. frontal area) resulting in the extremely low value of 15 sq. ft. of body cross sectional area for each 600 horsepower engine installed.

The extra wing frontal area added as an appendage to and below the wing center section, having width and height sufficient for propeller spacing and engine housings, in combination with the normal cantilever wing thickness, enables the wing structure and covering to envelope a large percentage of the cabin volume, as wing space structure and covering is used to contain cabin volume. The wing area saving provided by the airfoil body, replacing the area of 12′ wide by 15′ chord (180 sq. ft.) equals a wing weight of 2 lbs. per sq. ft. at the root section, totaling 360 lbs., which weight saving is directly contributed to *increased cargo space or payload capacity.*

For single engine relation, assume that two round streamlined bodies of the conventional high speed 600 h.p. single engine type, each with 20 sq. ft. frontal area, are spaced apart sufficiently for duplex propeller clearance, thereby doubling the power and all areas. The upper and lower dimensions then joined provide a wide uniform frontal area to transform into a short airfoil section merged with the upper wing contour of the outer airfoil, in contrast to the round streamline principle. While retaining the same load per horsepower and per sq. ft., the frontal area of the airfoil body type would equal 60 sq. ft., or 20 sq. ft. in excess of that of the two separate round bodies. The lift effect of the body represents 30 sq. ft., which is to be deducted from the non-lifting drag and results in a saving of 10 sq. ft., or 5 sq. ft. for each engine installed; consequently, the largely increased volume obtained by the greater useful frontal area is achieved *without increasing the non-lifting resistance and with an advantage in general aerodynamic and structural efficiency.* Further, the efficiency of the high wing type monoplane is achieved in combination with full landing gear retraction. Other practical advantages relative to safety, accessibility and simplicity are direct results which amplify the efficiency and economic advancement of this design trend.

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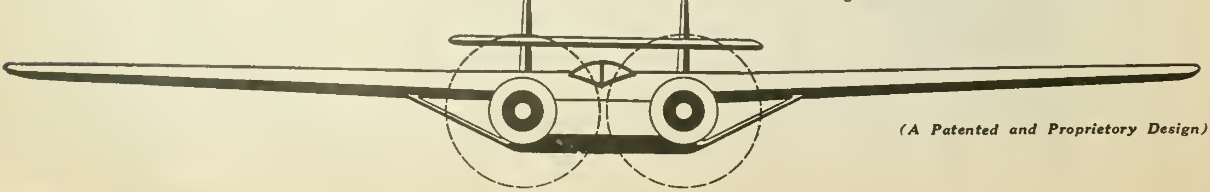

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Airways supplement the highways and railways in the transport of fast express

AIRLINES AND RAILROADS

By Alfred E. Smith, Editor, New Outlook

(Courtesy of New Outlook)

Alfred E Smith

IT has been justly claimed that existing American airlines are subsidized at public expense. In this our country is not unique. The aviation of England, France, Italy, in fact of all the major powers is subsidized. It also has been stated that many of our air mail contracts pay much more than do receipts from straight air passenger business. It does not seem to me that there is any cause for alarm in this situation. Those who wish, either from ignorance or for selfish motives, to detract from America's achievement in the air would have us believe that a precedent is being established in giving extremely essential subsidy to aviation. This, of course, is far from the truth. The railroads in their early days received enormous government subsidies.

American airlines are the real arteries of business today. Never before was there so great a need for speed in business communication. In a time when the bulk of business is made up primarily of small quick profits, speed achieves a special value which it does not have in normal times. A highly efficient system of air communication has been created painstakingly in the United States through justified subsidy, which we cannot now afford to allow to disintegrate for lack of Government aid.

The blind critics of this federal assistance to aviation are inclined to charge up as subsidy, costs which do not rightly belong in that category. Airway beacon lights and emergency landing fields are supplied by the Government solely for the purpose of achieving the highest possible degree of safety in the air. It would be as sensible to claim that lighthouses and the cost of their service were direct subsidies to shipping as to claim that beacon lights and emergency landing fields represent Government subsidy to aviation.

There is also some agitation for direct Government supervision of airlines. Most of this argument is based on the claim that airlines are in competition with railroads but it should be remembered that the railroads in their early days enjoyed a freedom from restrictive regulation. Regulation naturally is very expensive. It becomes bureaucratic. It also can become dangerous when applied to a new form of transportation which has not achieved its full growth. That growth should be attained without too many restrictive regulations.

The airplane is a natural development in the march of progress and supplements older forms of transportation as the railroad supplemented, and in some cases supplanted, water-borne traffic, and as automobiles supplanted horses and wagons.

The day has come when railroads should become transportation agents by whatever means is most economical and most useful to the general public. It is no mistake to permit them to supplement their present existing lines with trucks on the highways, boats on the waterways and airplanes in the air. Modern means of transportation, quick, efficient and convenient, naturally will make inroads on the older forms of transportation. The answer is to let the railroads modernize their transportation system. The answer also is not to create stifling government supervision of airlines which will retard the airplane from becoming an important factor in this scheme of modernization and progress.

The Federal Airways System

By Colonel Clarence M. Young

Assistant Secretary of Commerce for Aeronautics

THE Federal Airways System at the present time is comprised of 19,500 miles of lighted routes equipped with intermediate landing fields; radio communication and directional facilities and weather reporting service; and with municipal and commercial airports at terminals and some intermediate points. These aids to air navigation, in detail, include:

Beacon lights (1,623) at 10- to 15-mile intervals.

Intermediate landing fields (352) so spaced that in conjunction with airports they make landing areas available at intervals of approximately 50 miles.

Radio communication stations (69) for the broadcast of weather information to aircraft in flight and to airports and for the transmission of messages bearing on the safety and reliability of flight.

Radio range beacons (98) for the transmission of radio beams which aircraft may follow and keep on course regardless of conditions of visibility.

Radio marker beacons (108), low-powered radio transmitters marking important intermediate landing fields or other strategic points along routes under conditions of poor visibility.

Teletypewriter circuits (totaling 13,000 miles) for collection and transmission of weather information to airports and airway radio communication stations, for transmission of weather maps, and for reporting positions of aircraft flying along the airways.

Municipal and commercial airports serve as terminals for these airway routes. There are 549 municipal and 619 commercial airports in the United States, of which 218 municipal and 182 commercial airports are on or near lighted airways.

The Department of Commerce provides lighted airways and equips them with radio facilities and weather reporting services for the safety and reliability of all who fly, including scheduled mail, passenger and express services, miscellaneous commercial operators, private owners and the Army and Navy.

The use of the air is free to all, and for public safety it is necessary that certain routes be identified, charted and suitably equipped with aids to air navigation. Such routes must be available equally to all airmen because air routes cannot be monopolized. The only agency that is in a position to provide the necessary facilities on this basis throughout the United States is the Federal Government.

If the task of establishing and maintaining airways had been left in the beginning to private enterprise, air transportation, both scheduled and non-scheduled, would not have reached the present stage of development. For example, a company is formed to engage in the air transportation of mail, passengers and express between A and B. In order to provide a service that commerce and industry and the general public would employ, it must be safe and reliable and faster than existing forms of transportation.

But suppose there are no airway facilities between these two points. That means that the company cannot expect to operate with even a fair degree of safety and reliability, because it will be necessary to fly at night as well as day, it must have current weather service and landing facilities suitably spaced. Therefore, it is faced with the alternatives of abandoning the project or supplying the necessary aids to air navigation.

If it elects to undertake the latter plan, and if it is able to finance such a project, there is nothing to prevent another airline from being formed to operate between A and B over the airway established by the original company, and without the investment of one penny for airway establishment and maintenance. Also, the general itinerant airman, whether engaged in commercial or pleasure operations, would use the airway at no cost to anyone except the company that established the facilities. In the light of such eventualities, no airways would be built by private capital. However, two or more competing lines now operate over Federal airways in addition to non-scheduled flights by civil airmen and aircraft of the Army and Navy.

There are 137,000,000 miles being flown annually in the United States in all types of operation. It is definitely known that approximately 106,600 are scheduled daily on the Federal airways both day and night. Of the remainder, there are 25,800 miles scheduled daily on routes not Federally equipped, and these schedules are for day operations only. What percentage of the mileage flown in miscellaneous operations is on the Federal routes is unknown, but it is safe to say that it is quite large owing to the safeguards established thereon.

There are about 600 active and reserve planes in possession of the scheduled airlines while there are close to 10,000 civil aircraft owned and operated by firms and individuals engaged in non-scheduled activities.

Commerce and industry cannot afford to ignore a system of transportation that has demonstrated through year-in-and-year-out operation that it is three to four times faster than surface methods. The economic advancement of the nation depends to a great degree on the saving of time. The airplane, in both scheduled and non-scheduled services, has demonstrated that it can save time. But it cannot operate over great distances with the degree of safety and reliability which everyone now expects without aids to air navigation.

In addition to the application of airways to commercial air transportation there is another important factor which makes Government establishment and operation of air navigation aids necessary—their value as a military reserve. Mass movements of military aircraft can take place in time of emergency with utmost safety and efficiency over the lighted and radio-equipped airways. Without them chaotic conditions would exist, especially at night, and since speed would be a prime requisite in the event of such a concentration, movements would naturally take place both at day and night.

Under the Government economy program, no new airways are now being constructed. The ultimate goal hoped for by the Department of Commerce when Congress authorized it to establish and maintain airways, was 25,000 miles. If Congress in the future authorizes the resumption of airway construction and the goal of 25,000 miles is reached, the Department will regard that network of trunk line airways as sufficient for the needs of the nation. However, additional connecting and feeder routes will be demanded by sections of the country without adequate air service and in that event the Department believes it will be up to the states to arrange for the establishment and maintenance of regional airways to fit in with the Federal system.

Promotional activities included in the obligations of the Aeronautics Branch are handled by its Aeronautic Development Service. The more outstanding of these are:

Promotion and correlation of engineering testing and research.

Publication and dissemination of aeronautic information.

Assistance to communities in selection and development of airports; rating of airports.

Compilation and publication of air navigation maps.

A variety of projects has been undertaken in connection with these lines of endeavor. Each one represents a task that is essential to continued progress in safety, reliability and efficiency.

This is evident when the functions are more closely examined:

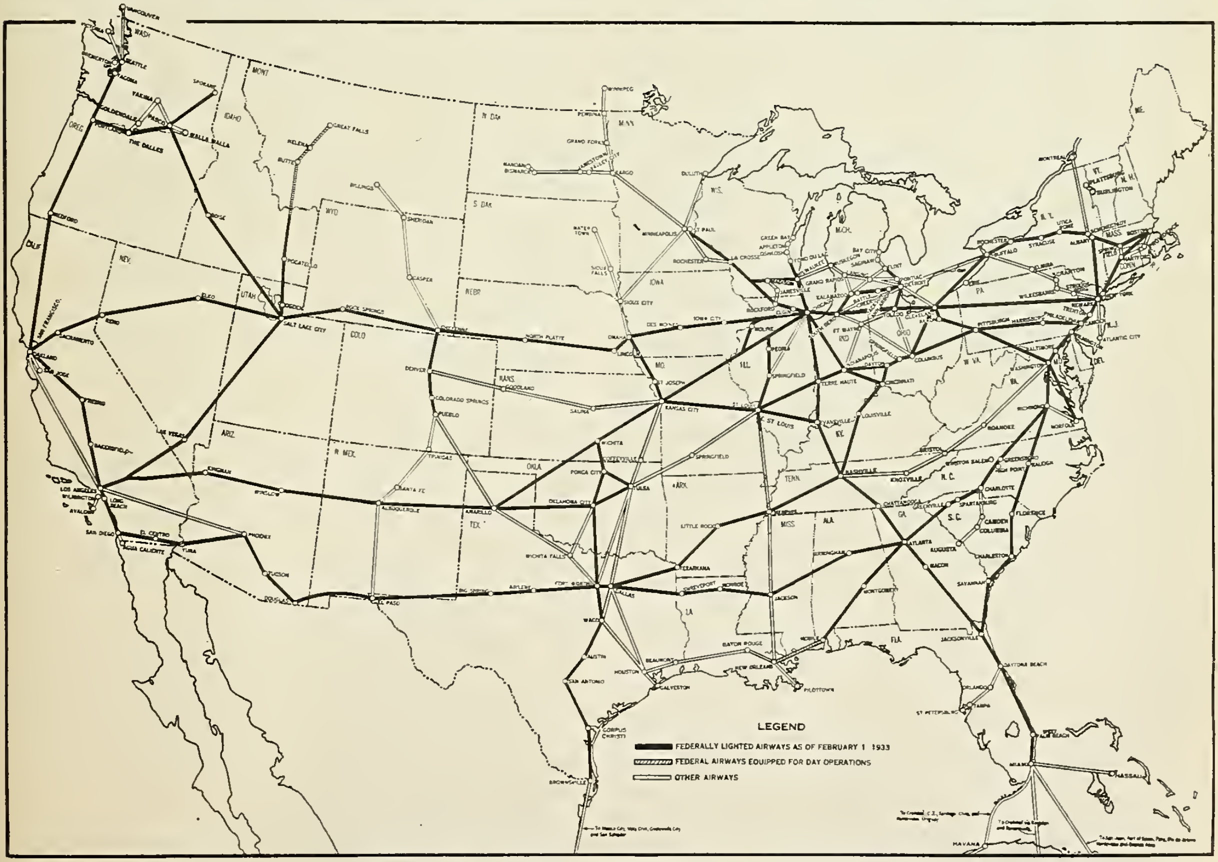
In engineering testing and research, many of the projects involve improvements in the aids to air navigation provided by the Department on the Federal Airways System. In this category is the work with visual and aural radio range beacons, apparatus for the simultaneous transmission of visual radio range signals and radio telephony on the same frequency, radio equipment for landing of aircraft in fog and radio direction finders. Likewise, tests have been made of new beacon lights and parts for beacon lights which have resulted in a great increase in efficiency of the lights in use on the airways.

Other research projects are concerned with problems affecting the whole industry, but of a nature precluding investigation by any one company. For example, experiments have been carried on and tests made looking to the development of crash-resistant fuel tanks, of sound insulation for aircraft, of mufflers for aircraft engines, and of signalling apparatus for directing airport traffic.

In disseminating information with respect to aeronautics, again, the Aeronautics Branch has undertaken only such tasks as it is especially fitted to handle, and which cannot be otherwise performed. Information with respect to status of aids to air navigation which must be known to airmen for the safety and reliability of operation, is disseminated through two Airway Bulletins and the semimonthly Air Commerce Bulletin. Statistical information on scheduled and miscellaneous aircraft operations, aircraft production and civil aircraft accidents is compiled and made available for general use.

Throughout the Federal Government those responsible

(*Continued on page* 70)


LEGEND
FEDERALLY LIGHTED AIRWAYS AS OF FEBRUARY 1 1933
FEDERAL AIRWAYS EQUIPPED FOR DAY OPERATIONS
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Latest airway map of the United States, showing airways which are equipped with Federal aids to air navigation

A MESSAGE

TO PRESIDENT FRANKLIN D. ROOSEVELT, MEMBERS OF HIS CABINET AND TO MEMBERS OF THE 73rd CONGRESS

◉

Frank A. Tichenor

THE argument of special causes in a time of national distress is not a practice generally to be approved. The purpose of this legislative issue of AERO DIGEST is to plead a special cause. It is to state the case for aviation and to explain its need for continued Federal support from your administration.

We undertake this task from a profound conviction that contrary to a popular misconception of a misinformed, and selfish minority, America's effort to establish herself in the domain of the air is not an insignificant, private cause. It is first and foremost a national concern; the goal so difficult of successful achievement that the only hope ever of winning it is through continued national effort with the fullest cooperation which an unselfish Federal Government can give it. It affects vitally our position in commerce, a responsibility to which the Federal agency is traditionally committed. It has become the first line of defense of the Army and the Navy. And yet for all of this importance it is still one of the youngest of our sciences, and for that reason also entitled to the constant care and concern of the Government.

The aviation industry is proud, Mr. President, in the knowledge that in you America has achieved its first flying Chief Executive. In the industry's struggles of recent years not the least formidable of the obstacles in the path to progress was the necessity of dealing individually and in the mass with a great many people who had never flown, who did not intend to fly, and who therefore were completely lacking in all of that first-hand knowledge which is so essential to an honest understanding of aviation. The handicap of proving the cause of flying to a non-flier long has been recognized by everyone in the industry as the almost impossible task. In the knowledge that they are dealing with an airplane owner and airplane user when it comes to stressing anew the importance of continuing the Navy's carrier program, in increasing the Army's air strength, in the undertaking at the earliest possible moment the completion of the Federal airways system, the men in aviation have cause for special confidence. The improvement of speed, reliability and maneuverability in the air—the cardinal points of any honest argument which the industry can make for continued government subsidy for aviation—can best be appreciated by one who himself has been in the air.

There can be no opportunity here for taking advantage of the personal enthusiasm of one individual. But the national defense and civilian aviation cannot fail to improve through progress with support which will not be given out of sheer fright generated alone by lack of knowledge and understanding of the purposes of aviation, which has often been the case in the past.

The responsibility of the President's Cabinet toward the nation's aviation is constantly increasing. In many of the departments of which you are members of that Cabinet are the nominal heads you will find that aviation is an important integral part.

As the official advisers of our President it is obligatory upon you as Cabinet Members at once to familiarize yourselves with the present status of world aviation.

Entering as you do upon the work of executive counselorship at a time when harassed and distressed nations are being tempted to fight their way out of worldwide depression through war and the provoking of war, aviation is a subject which you can ignore only at the possible price of complete failure in your duty to your President, and through him, to the American people.

And for the members of the 73rd Congress the American aviation industry has a special word which cannot be stated without carrying with it a special warning. It will be almost inevitable that to any special session which the President may call you that you must deal with the subject of aviation legislation. You are almost entirely a new Congress. One of your legislative responsibilities is toward the further building up, and the efficient maintenance, of the Federal airways system representing an annual operation and maintenance cost of approximately $8,000,000. There is in addition the country's 45,273-mile air mail system, 19,843 miles of which extend into foreign countries. This system over which planes now fly approximately 110,000 miles daily has been developed at considerable effort and expense, and the American people do not intend that it shall be neglected, nor destroyed, nor tampered with out of purely selfish political motives.

To the younger members of this Congress, whose great ambition must be some day to be older members of another Congress, a word of warning must be given that the American aeronautical industry is not interested in the granting of special local privilege which affects adversely the system as a whole. Aviation is primarily a national problem. Stopping a fast air mail plane at Podunk to pick up one letter and a hundred votes cannot be tolerated.

Other Congresses have not always been as fully enlightened upon the vital problem of aviation as they might have been. The recent effort to remove all government subsidy from air mail is a pertinent example of what not to do.

And in conclusion it should not be amiss to point out at this time that our real leaders, those who have made honest studies of our complicated transportation problem, do not view aviation as a sort of boll weevil which is at work destroying surface transportation. A word to the wise is sometimes sufficient, and so we trust that our new Congressmen will not waste any of their time and the people's money listening to that untruth from the misinformed railroad lobby at Washington.

THE PRESENT AIR MAIL SITUATION

By Richard W. Robbins

President, Transcontinental & Western Air, Inc.

ALTHOUGH there have been air mail services in this country since 1918, the expansion of the original routes into a national air transportation system did not take place until the enactment by Congress of the McNary-Watres Act in April, 1930. At the time of the passage of this act, the air passenger transport industry was in a chaotic condition. This law was enacted for the purpose of reorganizing the air mail and the air transport industry on a sound basis. It was then necessary to eliminate duplication and to build a unified and coordinated system which would be national in scope and service.

In the space of three years, the United States has become the leading nation of the world with its 28,000 miles of Department of Commerce airways, including airports, visual and radio beacons, and weather reporting system. Over these airways, the air transport operators fly 131,000 miles each twenty-four hours. Forty per cent of this mileage is flown at night. Nowhere else in the world is night flying carried on to this extent.

The air transport operators have accomplished this advancement through the aid of the air mail appropriation. The objective, simply stated, was, and is now, to give life to a new transportation industry which promises shortly to become self-supporting. Air transport and its associated manufacturing organizations form the nation's greatest military reserve. The air transportation system, allied with surface methods of transportation, rounds out the coordinated whole, eliminating no existing method but acting as the perfect complement to all.

The aid received by the air mail operators from the Federal Government has immeasurably hastened the day when independent commercial operation will be possible. The operators, in order to achieve that objective, have left no stones unturned in their efforts to decrease expenses and at the same time obtain the greatest possible revenue. Methods adopted by the air mail operators in the development of aircraft, and in the conduct of their operations, are the methods giving the greatest promise of reaching the goal of economic independence set by the Government.

In this age of pacific talk and reduced armaments on one hand and undeclared wars flourishing on the other, it behooves the United States, as a nation, to give thought to protecting the sovereignty of the American people. We have been beguiled into scrapping much of our Navy and reducing our Army to an insignificant dress parade police force. The air arms of the military services have suffered equally with the older forces. If the lessons of the Great War were not enough, we might profit by the reports from the fighting fronts of this very moment, which mark the airplane as the most effective weapon in the majority of engagements, in many cases spelling certain victory.

The aviation industry, including its every aspect, is unique in that it is the nation's most mobile and speediest transportation system and at the same time constitutes our greatest military reserve. The very mobility of air transport causes it, in event of national emergency, to be capable of deciding a major issue. This is only natural when we consider that the commercial adaptation of aircraft did not come until after the War, and then as a result of military operations' having demonstrated the value of the airplane in speeding up the conduct of business, either military or commercial.

It is to be expected that in times of economic stress Congress should diligently search the military establishments for places to save money and that retrenchments should be made. On the other hand, it is extremely shortsighted to consider the crippling of an industry which is growing and on the road to economic independence and which is recognized as a keystone in business life as well as in national defense. What better evidence could we have of the vitality and economic justification of the industry than the cold statistics which show the growth and development of the air transport industry even during the pesent period of tremendous deflation and depression? Yet, this is exactly what the Congress of the United States threatens to do.

At the very inception of the air mail, and up to date, value received by the Government has hardly entered the scheme of payment to the operators. The weight of mail and the distance carried, which is the only gauge of the public service rendered by the respective operators, has, to date, played an insignificant part in the plan of compensation. Nor has any provision been made, or any program laid down which would definitely set a time when the air mail service would be self-supporting.

The immediate task before the aviation industry and the public which it serves is twofold: first, the leaders of the new administration and the individual members of Congress must be shown the facts proving how vital air transport is to the needs of the country, both as a carrier and as a military reserve; secondly, a rational national aviation program must be evolved which clearly sets a definite date upon which Post Office compensation to the air mail operators will be balanced by the returns from postage.

We have before us the Bill (H. R. 14605) introduced in the House of Representatives by Congressman Clyde Kelly of Pennsylvania on February 8, 1933. This is a step in the right direction, although its present form leaves considerable to be desired.

(Continued on page 72)

Adequate National Defense Depends Upon Federal Financing of Civil Aeronautics

Major General James E. Fechet, U. S. Army (Ret.)

THE new deal which the United States gets after March 4th is of the utmost importance to a great many industries, but to none more than our own struggling and neglected aviation.

Let us hope that the personnel of our new Democratic administration will be sufficiently broadminded and intelligent enough to handle the situation to the best interests of the people of our nation.

Prompt and efficient development of this vital phase of our national life can not be had without Federal financing. Unfortunately, the demands of commercial flying are not now, and for many years will not be, sufficient to pay for the development at the speed necessary for our varied and growing requirements.

We must have a large and efficient industry, capable of supplying all wartime demands of the Army and Navy, or face great danger and enormous added expense when war does come. It is well to reflect upon the fact that we may not have two-thirds of Europe lined up between our enemies and ourselves, to hold off an attack for a year while we feverishly endeavor to make up for our neglect to prepare for such an emergency.

The present peacetime materiel requirements of the military forces and the commercial industry do not supply enough work for one-tenth of the manufacturing facilities necessary in time of military necessity. In times of peace, the requirements of the military services never will keep alive an industry sufficiently large to supply our needs in time of war, and so it is for that reason we must turn to the development of commercial flying to furnish the additional demand for equipment and personnel.

The Federal authorities are our only hope in the present state of the industry.

They must supply the life blood for this expanded industry in the form of subsidies. Not only should these subsidies be paid for carrying the mail, but all operating companies should receive subsidies for the carrying of passengers until such time as operating costs can be lowered to the point when the companies will be on a self-sustaining basis.

If we could increase the demand for air equipment and personnel, say fifty fold, it is easy to see that costs of flying equipment and flying operations would be greatly reduced, as mass production certainly will do for the airplane that which it has done for the automobile.

The railroads and steamships have been receiving direct subsidies for a great many years. The buses continue to benefit by an indirect subsidy in the form of practically free road service, which, of course, is paid for by all of the taxpayers, whether or not they use this mode of transportation for passenger travel or the shipment of goods.

By this time some of the forms of surface transportation should have outgrown the necessity for Governmental aid and should allow this new and growing means of air transportation to be developed partially at the expense of the Federal government.

The national defense now can be considerably strengthened at a comparatively limited cost, and at the same time a most vital and highly specialized manufacturing industry can be built up, by proper legislation, for the air services of the Army, Navy, Post Office and Treasury departments.

New "five-year" programs should be inaugurated immediately for all four air services.

Double them in size if necessary. The cost will be amply justified by increased national service and security. Much of the expense will be returned to the Treasury in the form of taxes.

In addition to the benefits of greatly increased national safety and insurance against the horrors of war, we can vastly improve our knowledge of the country by compiling a complete and accurate map through the Coast and Geodetic and Geological Surveys, and greatly improve our lifesaving, immigration and customs services by giving them adequate air service.

We can greatly benefit business in general by speeding up mail and air express. Business can be saved much money by the speedy transfer of securities, bonds, checks, paper currency and other highly valuable and quickly needed articles such as medicine, radium, etc.

The history of the development of flying shows that the funds allotted to the Army and Navy always have produced the greatest development in flying equipment, its accessories and flying and ground personnel.

In the field of aerodynamical research, we know that many of our best wing sections bear the stamp of the Army and Navy or their personnel. The air-cooled radial engine was developed to its present high state of efficiency and reliability in response to the demands of, and in cooperation with, the military services. Parachutes, which have saved the lives of a great many civilian and air mail pilots as well as those engaged in military pursuits, are due entirely to development work and funds supplied by the national defense units for which they were primarily intended.

Therefore, let's acknowledge that subsidy is indispensable for the aeronautical industry in order to achieve the quick development we need, and go ahead and subsidize until the accomplishment of our ultimate purpose — "to make the United States first in the air," which means, of course, both in a military and commercial way.

RESTRICTIONS HINDER PROGRESS

By William B. Stout

RESTRICTIONS never helped any industry. When rules go down in a book dictating how a modern business should be run, then progress halts and obsolescence is made permanent. No industry can be made better by more restrictions, and business in this country never can go ahead until the Government—state, city and national—takes its hand off business of which it knows nothing (except its political value) and lets industry go ahead on its own merits and good judgment. The railroads, therefore, are not helping their own cause when they ask for restrictions on competing transportation systems such as buses, trucks and airplanes. They would do well to cooperate with these groups in an effort to have all the boards, rulings and interferences on the part of the Government supplanted by simpler systems within the industry. The ultimate goal should be, not to have more restrictions put on buses, trucks and airplanes, but to arrange a method by which all can develop normally to the best advantage of the public and the employment of labor in large numbers at fair wages.

While the labor unions strive for the employment of the greatest number of laborers at the highest wages, industry itself works even more toward this end; for these unions also suffer from too many regulations which, while reasonable when they were drawn up, are out of date in the light of modern progress. The Interstate Commerce Commission was a valuable body when it was formed, but in its dealing with the railroads it has reached a point where a new set-up must be made or the whole idea eliminated. This is a day of change through force of necessity, and if we try to hold things in a *status quo* we merely lengthen the period of economic hope. Business will come back only when many men go back to work; they can not do this until the industries in which they have been employed show a profit. The railroads never can show a profit with the Government restrictions and taxes now imposed upon them. The railroads have been blamed from every angle for a lot of mistakes, tremendously heavy railroad equipment, dangerous grade crossings and what not.

Politics always has played with the most prominent industry of its time as a political football, and the railroads are a glaring example. The unions have retarded labor's progress in that industry by out-of-date rules. The rate commission holds down revenues and eliminates profit and yet can not change rapidly enough to meet changing conditions.

Fairchild Aerial Surveys photo

The Master Car Builders' Association has petrified design in the matter of cars and equipment with little possibility of improvement except in minor detail. The Post Office Department has designed details of the interior of mail cars long out of date and unnecessary and with which it is impossible to build a light-weight modern vehicle or even a safe one. Type of management and business structure has stagnated also in a strongly entrenched set-up. Multi-million-dollar terminals have been built, valuable chiefly as monuments to a past industry, but which the taxpayer must support. Meanwhile the humble taxpayer votes for taxes and more taxes on the long-suffering railroad and then lends the railroad, from the Government, money to pay the taxes. These again are spent to build parallel roads to compete with the rails that were supposed to have paid the taxes. And so it goes, 'round and 'round.

The railroad problem is not an impossible one. The management and present personnel are capable of dealing with the situation if they did not have to overcome such a tremendous amount of red tape, restrictions, rules and political opposition.

When evolution came to most industries, it manifested itself through new products. The automobile industry came not from wagon plants nor livery stables; pneumatic tires did not come from wheel manufacturers; Duco finishes did not come from the paint makers, nor rayon from the silk industry. These things came from new developments which gave new services and which automatically created new business structures. Balloon tires for automobiles came from the airplane, as did the pyroxylin finishes and air-cooling of engines. Likewise, the aviation industry will produce numerous other inventions for the benefit of business through the value of the super-engineering which must be put into the modern airplane.

Airplane engineering can (and will within the next few years) take two-thirds of the weight out of the present automobile, giving it greater economy, luxury and speed, with a lower first cost. At the same time, in its own industry, it will step up speeds from the present 125-miles-per-hour cruising to three-miles-a-minute, or more, cruising. When such speeds are talked of for safe commercial passenger transportation, one realizes immediately, whether or not he is a railroad man, that (*Continued on page* 68)

EDITORIALS

This Embargo Business

AUTHORITIES agree that the aircraft industry is a vital factor in the national defense of this country. The capacity of the nation's civil airlines will have to be greatly expanded in time of emergency to fulfill their transportation function alone, and private aircraft will be commandeered when needed. The industry, therefore, must be maintained on a scale which will render it possible of effective emergency use. Factories must be kept in operating condition and engineering and technical personnel maintained.

To do this requires every item of production in peacetime which possibly can be found. Because of this, the export business which the industry has built up, though small as compared to that of other industries, is of great importance. A few years ago export business in American aircraft was negligible. In the last few years, however, the industry has developed an export business systematically, and has earned its place at the top of the group of aircraft and equipment exporting nations.

This was accomplished principally by the reputation for quality which American aeronautical equipment has achieved the world over, and by the courageous efforts of the manufacturers themselves to secure the business. It is significant that in these difficult times aircraft and equipment factories, because of export business, have had more work than they would have had otherwise, and have been able to keep themselves in better shape to spring into full usefulness in case of a national emergency. Had it not been for the export business during the past year, some American manufacturers would have had to close their factories.

Naturally, the aviation industry is jealous of its export trade and wishes to maintain and increase it. The industry does not want to see this trade suffer, even for the furtherance of a policy of general disarmament, unless that policy is going to be general and binding with all nations and unless it is going to be effective.

A good part of the export trade in aircraft and equipment is with foreign governments. The smaller countries have found an air force inexpensive defense against revolutionary movements and against outside powers. These air forces are an effective means of keeping the peace. As illustrations, we have only to recall the revolution of the Chilean Navy, involving warships costing millions to build. The uprising was suppressed by the Chilean Government's flying airplanes over the ships and threatening to bomb them. A more recent instance occurred when the crew of a Dutch warship in the Dutch East Indies revolted, and surrendered after one bomb was dropped from a Dutch Government airplane.

In the case of many countries it will be impossible for them to manufacture aircraft up to modern standards, due to the lack of up-to-date industrial facilities and materials. These countries will have to buy from leading manufacturing countries. One of the most important factors in the building up of an air force is standardization. A country must adopt certain types of equipment and keep them in repair and flying condition. To maintain these standards means greater efficiency at less cost. It also means that once the standards are adopted the country must be certain it can continue to obtain deliveries. It cannot afford to have its air force crippled by a sudden and arbitrary declaration of embargo by the nation from which the equipment is purchased.

Even the *discussion* of embargo power acts to the practical detriment of aircraft exports. Once the fear occurs to the purchasers that they may be subject to an embargo they look for their equipment in competing countries which they feel will not hamper them with embargoes. An important factor in the decision of a South American country to buy ten European planes was this fear that perhaps deliveries from the United States were going to be interfered with.

A great deal of the export trade in these products is of an emergency nature. The government which the United States recognizes finds it is confronted with an uprising and wants aircraft. It wants them in a hurry. It wants to know that if it buys them it can be certain of delivery. It wants to know that these deliveries will not be held up as a result of pressure brought to bear on United States Government officials by well meaning (but impractical) peace societies, perhaps inspired by our European competitors. A sound way of preventing this is to grant no discretionary power, but to describe the authority specifically, so that seller and buyer and those administering Government policies can know exactly where they stand and what they can do.

Is it not contrary to all principles of international law to embargo shipments to a country, the sovereignty of which our Government recognizes? The United States is a party with Great Britain, France and others to the so-called "open door" treaty with China. Can we live up to this agreement and yet, by embargoing shipments of aircraft, refuse to recognize the rights of China to independence? The United States has ratified agreements with all the Latin American republics forbidding its citizens from exporting arms and munitions to revolutionary factions. Can the United States consistently refuse to allow shipments of aircraft to go to the nations we recognize and with which we have such agreements?

It is certain that Great Britain, France, Italy and even Germany (which is bound by the Versailles Treaty not to build military aircraft, but does so and exports them by means of a factory in Sweden) will sell these governments aircraft if we do not.

◆

Building Good Will

AN enviable record for efficiency has been established by Pan American Airways' international air mail —99.81 per cent of all trips completed on schedule. In addition to its normal operations, relief work has been rendered during times of hurricane and other national emergency in Central American countries.

Direct assistance has been given by Pan American Airways System in promoting sales of American aircraft and material in South American countries that formerly purchased European equipment.

The sound operation of its 107 transport planes along the 20,000 miles of airways has resulted in fostering good will for our government and the industries of the United States in general.

A SYSTEM OF RADIO AIDS FOR FOG LANDINGS

By Harry H. Blee

Director of Aeronautic Development
United States Department of Commerce

A RADIO system to assist aircraft in making reliable landings in fog and under other conditions of poor visibility is one of the projects engaging the attention of the Aeronautics Branch of the Department of Commerce as part of its program of research directed toward the development and improvement of aids to air navigation. This landing system leads the pilot down to the proper runway of the airport on a suitable spatial landing path and at the same time gives him definite indications of his position in relation to the runway as he approaches the field.

WORK on this research project was divided into three stages, the first of which consisted of fundamental experiments and research to develop the basic component parts of the system, including a runway localizing beacon, marker beacons, a landing beam and suitable radio receiving and indicating apparatus for use in the air. The second stage consisted of the practical development of these component parts, fitting them together to form a complete system and finally demonstrating the practicability of the system through the medium of an extensive series of hooded landings, conducted by the Aeronautics Branch at its experimental flying field at College Park, Md. The third stage of the development, which involves the testing of the complete system experimentally under the conditions obtaining at a commercial airport, is now under way at the Newark Municipal Airport, where the City of Newark has cooperated with engineers of the Department of Commerce in the installation of the system.

The work at the Newark airport will include fog landings as well as hooded landings. The former are, of course, more representative of operating conditions. While the Newark installation is not for service use in air passenger operations, it affords an opportunity for cooperative experimentation with air transport operators. Several of the operators have already indicated their intention to equip one or more test planes for trials of the system. In this way it is hoped that the possibilities of the system will be more fully developed.

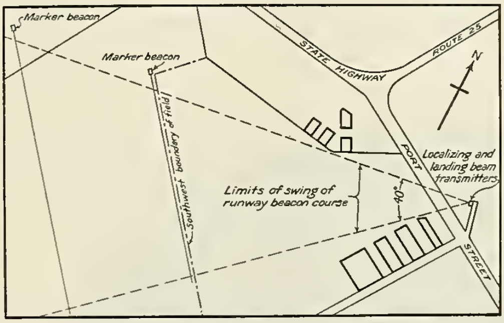

Marker beacon
Marker beacon
Southwest boundary of field
STATE HIGHWAY
ROUTE 25
N
PORT
STREET
Localizing and landing beam transmitters
Limits of swing of runway beacon course
40°

Fig. 1. Diagram of Newark Municipal Airport showing location of transmitting equipment for radio landing

Fig. 2. Typical marker beacon installation

The installation of radio landing aids at Newark airport includes three elements, a runway localizing beacon, a set of two marker beacons and a landing beam. The runway localizing beacon, in addition to providing definite means of locating the airport, gives indication of the directional position of the aircraft and permits keeping the craft directed to and over the desired landing runway. The marker beacons give the longitudinal position of the aircraft when approaching the airport. One marker beacon is located about 2,000 feet from the landing area while the other marks the boundary or edge of the field. The landing beam provides vertical guidance. It employs an ultra-high-frequency radio beam, of the order of 100,000 kilocycles, directed at a small angle above the horizontal, and thereby marks out a convenient gliding path for the landing aircraft, clearing all obstructions. A schematic diagram showing the location of the transmitting equipment at the airport is given in Fig. 1.

The transmitter used for the runway localizing beacon operates on a frequency in the neighborhood of 300 kilocycles and is similar to the visual type transmitters designed for the radio range-beacon stations on the Federal airways system. The use of a visual type transmitter facilitates automatic volume control reception on the aircraft. This is quite essential, since the pilot, in making a landing, is concerned with so many things that the burden of close manual adjustment of receiving-set sensitivity should be eliminated. Small crossed-loop transmitting antennas are employed in order that the runway beacon may be located near one end of the runway without constituting an obstruction to flying. The loop antennas consist of seven turns of wire on wooden frames 10 feet high by 12 feet in length and are housed in the same building as the transmitting set. A goniometer is provided to the end that the runway localizer course may be swung to take care of different wind directions. At the Newark airport the wind, under conditions of poor visibility, is usually from the northeasterly quadrant. The runway beacon accordingly is located at the northeast end of the field. Thus by swinging the course over an arc of 40 degrees it is possible to accommodate practically all wind directions pertaining at times when the visibility is low.

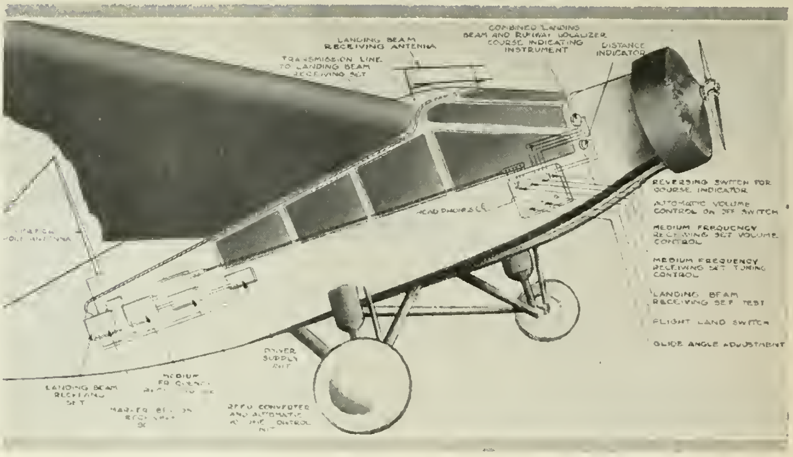

LANDING BEAM RECEIVING ANTENNA
TRANSMISSION LINE TO LANDING BEAM RECEIVING SET
COMBINED LANDING BEAM AND RUNWAY LOCALIZER COURSE INDICATING INSTRUMENT
DISTANCE INDICATOR
HEAD PHONES
REVERSING SWITCH FOR COURSE INDICATOR
AUTOMATIC VOLUME CONTROL ON OFF SWITCH
MEDIUM FREQUENCY RECEIVING SET VOLUME CONTROL
MEDIUM FREQUENCY RECEIVING SET TUNING CONTROL
LANDING BEAM RECEIVING SET TEST
FLIGHT LAND SWITCH
GLIDE ANGLE ADJUSTMENT
POWER SUPPLY UNIT
LANDING BEAM RECEIVING SET
MARKER BEACON RECEIVING SET

Fig. 3. Skeleton view showing fog landing radio installation

The marker beacons are located at the southwest end of the airport. As noted in the foregoing discussion, one marker beacon is provided about 2,000 feet from the field while a second marker defines the boundary of the field. The marker beacons are very simple, each consisting of a low-powered transmitting set and a long, low horizontal antenna. These transmitting sets operate directly from the commercial power supply. Each set employs three tubes, a radio-frequency oscillator, an audio-frequency oscillator for modulating the radio-frequency at the desired audio-frequency, and a rectifier tube for providing plate power supply to the two oscillator tubes. Different modulation frequencies are employed for the two marker beacons to facilitate ready identification of the marker beacon being passed over, the one at the field boundary having a modulation of about 250 cycles per second while the other has a modulation of approximately 1,000 cycles. The transmitting antenna for each marker beacon consists of a horizontal wire a few feet above the ground and extending across the southwesterly approach to the landing area a sufficient distance to intersect the path of the aircraft for all orientations of the runway beacon course. The simplicity of construction of a typical marker beacon installation is shown in the accompanying Fig. 2.

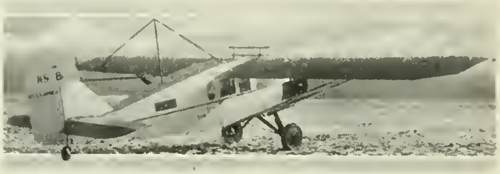


Fig. 4. Receiving antennas on fog landing airplane

The experiments at Newark will include the determination of the most suitable radio frequency (from the viewpoint of an airline operator) on which the marker beacons should operate. A radio frequency of about 10,000 kilocycles will be used in some of the tests, in which case a simple marker beacon receiving set is required aboard the aircraft. Tests also will be conducted with the marker beacons operating on the same radio frequency as the runway beacon, thus permitting their reception on the medium-frequency receiving set normally available on the aircraft. The need for a special marker beacon receiving set is thereby obviated, but careful adjustment of marker beacon power output is required to prevent interference with the runway beacon course indications when the airplane is directly over a marker beacon. The severe requirements imposed upon the system in the experiments at College Park, both by the small dimensions of the field and the obstructions in the approach, did not permit the successful use of this arrangement. In a third series of tests, the marker beacons will operate on a frequency in the aircraft communication band 3,000 to 6,000 kilocycles, in order that the high-frequency communication receiving set commonly carried on aircraft may be utilized for receiving the marker beacon indications. Control equipment has been provided to the end that both the radio telephone communication signals and the marker beacon signals may be received during a landing with minimum effort on the part of the pilot.

The landing beam equipment is located adjacent to the runway localizing beacon. The transmitter employs a transmitting circuit arrangement specially designed for ultra-high frequency operation, 100,000 kilocycles. The transmitting antenna array consists of 12 half-wave horizontal antennas, so grouped as to give the necessary directivity of beam in the vertical plane while spreading the beam out in the horizontal plane to afford service in the 40-degree sector to be covered.

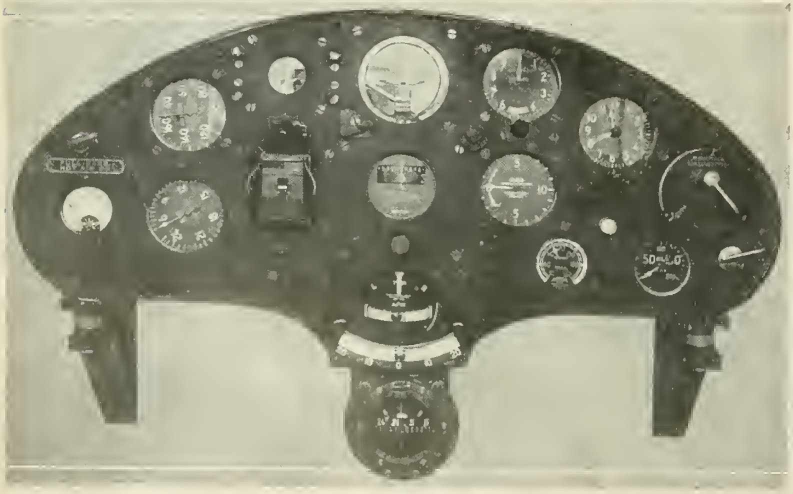


Fig. 5. Instrument panel of the specially-equipped Bellanca airplane shown above

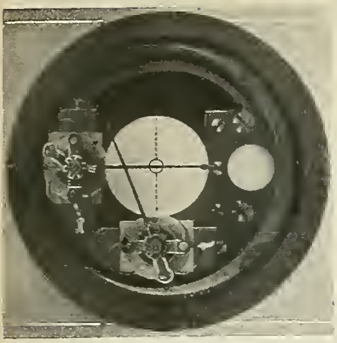


Fig. 6. View of "combined instrument"

This results in a fan-shaped beam which provides vertical guidance for all orientations of the runway beacon course within the limits specified. The antenna installation is 16 feet high, by 10 feet wide, by 2.5 feet deep overall.

The theory of operation of the landing beam is readily understood. Maximum field intensity is produced along the inclined axial plane of the beam. The aircraft does not fly along this plane, however, but on a curved path the curvature of which diminishes as the ground is approached. This path is the line of equal intensity of received signal below the inclined axial plane. The diminution of intensity as the aircraft drops below this plane is compensated for by the increase in intensity due to approaching the beam transmitter. Thus by flying the aircraft along such a path as to keep the received signal intensity constant, as observed on a microammeter on the instrument board, the pilot descends on a curved path suitable for landing. If the aircraft rises above this path, the microammeter deflection increases. In like manner if it drops below the path, the deflection decreases.

A typical aircraft receiving installation required for utilizing the radio landing aids described in the foregoing is illustrated in Fig. 3. The medium-frequency receiving set shown is of the type commonly used by air transport operators for the reception of radio range-beacon signals and airways weather broadcasts. This set is augmented by a reed converter and automatic volume control unit for use with the signals from the runway localizing beacon. Visual course indication is given the pilot by means of the vertical pointer of the "combined instrument" shown on the instrument board. The vertical pointer of this instrument, which is described later, is pivoted about the lower end and swings left or right, depending upon whether the aircraft is to the left or right of the runway course. A reversing switch is provided in order that the deflection of the pointer and the direction of deviation of the aircraft with respect to the course may correspond whether the aircraft is flying away from or toward the runway beacon.

The marker beacon receiving set required when the marker beacons operate on a radio frequency of about 10,000 kilocycles employs two tubes, a detector and an audio-frequency amplifying tube. The output signal is aural and is heard through the headphones when passing over the marker beacons. The set is coupled to the same receiving antenna as is used with the medium-frequency receiving set, the coupling arrangement being such that the tuning of each set is independent of the other.

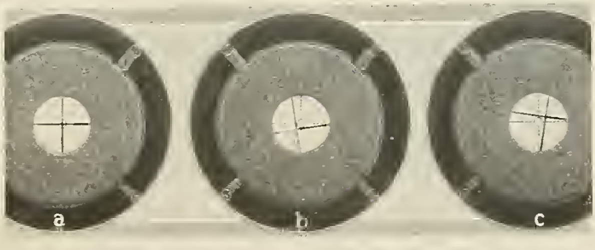


Fig. 8. Typical course indications with "combined instrument"

The landing beam receiving set employs a detector tube, an audio-frequency amplifying tube, a reed filter and a cuprous-oxide rectifier. The receiving antenna is of the half-wave horizontal type with a reflector and is mounted above the center section (Figs. 3 and 4). The voltage induced in this antenna by the landing beam is fed to the receiving set by means of a shielded parallel-wire transmission line. After detection and amplification, the signal is rectified and the output current fed to the combined instrument, the landing path indications being given by the horizontal pointer of this instrument. During landing, this pointer is maintained in the horizontal position. A rise of the pointer above this position indicates that the aircraft is above the proper landing path, while the reverse is true if the pointer falls below its horizontal position.

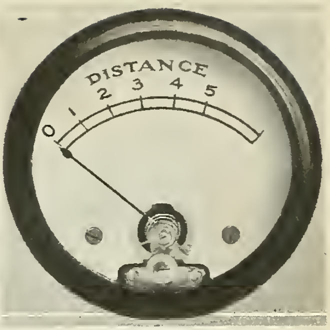


Fig. 7. Approximate distance indicator

The radio control panel contains the usual tuning and volume controls for the medium-frequency receiving set, a switch for operating this set with either automatic or manual volume control and the reversing switch for the vertical pointer of the combined instrument, the function of which is described in the foregoing. There is also provided an adjustment for altering the steepness of the landing path to suit the particular airplane, a push button for testing the landing beam receiving-set and a "flight-land" switch. In the "flight" position, this switch connects the horizontal pointer of the combined instrument to the output of the reed converter, thereby indicating volume of received signal in the output of the medium-frequency receiving set. This indication is for the purpose of informing the pilot that his receiving set and the beacon transmitter are functioning properly. Otherwise, the vertical pointer, which indicates the beacon course, being of the zero-center type, might read "on course" with the beacon signal off or the receiving set not functioning. In the "land" position, this switch turns on the landing beam and marker beacon receiving sets and connects the horizontal pointer of the "combined instrument" to function as the landing path indicator, as described in the foregoing.

In addition to the combined instrument the pilot has a second radio instrument called an approximate distance indicator. This instrument is operated by the medium-frequency set in conjunction with the automatic volume control unit, and gives an indication of the approximate distance of the airplane from the runway localizing beacon.

The photograph of an airplane equipped to receive the radio landing aids appearing in Fig. 4 shows the receiving antenna for the medium-frequency and marker beacon sets and the special horizontal receiving antenna with a reflector for the landing beam set.

A photograph of the instrument panel of this airplane is presented in Fig. 5.

(*Continued on page* 68)

OLD PILOT'S MESSAGE TO CONGRESS

By

Cy Caldwell

IT has always seemed to me that you gentlemen in Congress are the most handicapped governing group in the world. And the wonder is not that you manage to govern as well as you do, but that you are able to govern at all. You have so many people tugging at you, and all in different directions, that it is surprising that you manage to move anywhere. And even if you shut yourselves up in your offices, surround yourselves with guards to and from the House, and thus evade personal man-handling, still the postman and the telegraph messenger can have at you with information from all quarters—and all of it different.

On this point it seems your trouble is not lack of information, but simply too much of it. If you tried to digest one-tenth of it, you'd be bilious. I never thought I'd add to your burdens with any suggestions, but the fact is that we've reached a crisis in this aviation business, and we've got to give you our side of the story. Will you read this? It isn't propaganda. It is the plain unvarnished truth about commercial aviation and national defense as it looks to an old pilot who started flying in 1915 and kept steadily at it until a little over two years ago, when he got too feeble to fly nights.

At this writing the Senate has voted to strike out the entire $19,000,000 appropriation for the inland transportation of mail by aircraft. The opposition called it an air mail subsidy. In part that is what it is. Senator Robinson held that it was a luxury. And that is what it is not. If we are to have any air defense of our nation that is a real defensive arm in more than name only, then air mail is not a luxury but a necessity.

But let us dispose first of the many arguments about the advantages of speed, about the value of air mail and passenger airlines as time savers. If all that the airlines represented was a saving in time to those who used them, then the taxpayer who did not use them would perhaps be justified in demanding that the entire cost be borne by those who benefited, and not by the citizens as a whole. I appreciate the justice of such an argument, as I am not one to whom speed or the saving of time appeals, because I'm never in a hurry myself, and never have been in a hurry. All of my life I've always had plenty of time for all that I had to do; and although I use airlines in preference to trains, I don't use them because I'm rushed to death but simply because I still like to fly occasionally.

However, in importance the saving of time isn't the half of it, nor even a tenth of it. What the subsidized air mail represents is an integral and necessary part of our national air defense plan. Even if we had had no subsidy for air mail, much of that money would have had to be spent by the Army Air Corps to develop the airways and the flying fields without which it would be almost impossible for our air forces to fly about the country in time of war. In fact, if you recall the Air Corps maneuvers of two years ago, when 672 Army airplanes made a tour of the eastern part of the country, you will appreciate that this great movement would have been impossible without the commercial facilities of airports and service that had been made available by the encouragement of commercial aviation through the air mail subsidies.

Airways and airports are to the airplane what tracks and terminals are to the railroads, or what navigational aids and harbors are to ocean carriers. It would be as difficult to move air forces about the country without airways and airports as it would be to handle ocean steamers without lighthouses, bell-buoys, harbors and wharfs. If our country had developed no harbors or no navigational aids for commercial ocean traffic, it still would be necessary to provide such facilities for the safe and proper use of our Navy, with dockyards where needed. Now, all of these facilities have been provided for our Army Air Corps and for our Naval Air Service by the air mail subsidies without making them a direct part of military and naval expense. In fact, these facilities that would have been supplied, at least in part, as national defense requirements, have been supplied at far less cost, because the public has been given a commercial mail and passenger service for whose cost they have paid a large part in postage stamps and passenger fares.

Furthermore, a great part of this expense has been borne, not by the Federal Government, but by municipalities and private companies. I refer to the airports, most of which are municipal developments, made possible only because the Government subsidized air mail and thus gave the municipalities a reason for having an airport. It must be remembered that this is a large country of vast distances and that in time of war it would be necessary to move large air forces about the country to meet a threatened attack at any point. The bases for these forces have been supplied by municipalities, and the service that aircraft need in order to fly at all is available at those bases, in peace as in war.

The lighted airways installed by the Department of Commerce and maintained for the use of commercial air mail and passenger lines should not be regarded as a direct charge on those commercial activities alone. On the contrary, sensible and far-seeing defense measures would demand such airways for the use of our air forces in time of war. It is unthinkable that in wartime we should be content to fly only in daytime or in fair weather; even without mail lines we should have had to install navigational aids such as lighted airways and radio beacons, or else be content to suffer the lack of them in a time of greatest need. Thus all of these ground facilities, without which safe flying is impossible, would have had to be supplied at the taxpayer's cost anyhow, air mail or no air mail. Under the wise plan made possible by the air mail appropriations, the public has paid for this but has received a direct and immediate beneficial return through the facilities provided for its use.

Now, many citizens think of our Army and Navy aircraft as an air force to use in time of war. As a matter of fact, the aircraft we have today are no more than the be-

(Continued on page 69)

TRIM AS A THOROUGHBRED

The new 1933 WACO Cabin Plane is a joy to behold and to fly

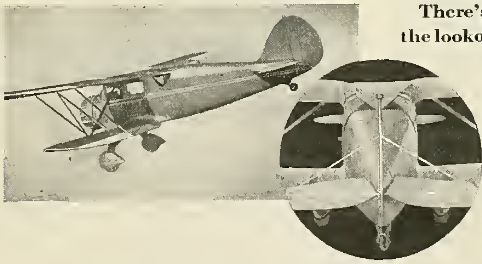
THE SHIP OF SHIPS FOR DEALERS OUT FOR BIGGER SALES

It's a craft of patrician beauty—this newest WACO Cabin Ship. Silver wings as graceful as a swallow's. Sleek, streamlined fuselage of vermilion, black or silver gray. From stem to stern a masterpiece of classic design. To *see* it is to yearn to *fly* it. And then the real thrills begin.

Slip into the luxurious, form-fitting seat behind the wheel—a seat that gives the comfort of your favorite easy chair at home. "Long flights without tiring," you'll say to yourself. Look out the windows—both front and rear—and see how better vision in all directions has been achieved.

And here's a device that controls interior ventilation—that brings into the cabin warm, cool or tempered air—as much or as little as you want.

At 1900 R.P.M., this brilliant performer gives you a cruising speed of 125 miles an hour—a top speed of 145. And like *all* WACOs, this model has the mystifying ability to get in and out of tight places shunned by ordinary craft. Any good pilot can actually take off or land it in *less than 100 yards* (91 meters)! Don't try it with any other ship!



Last year people bought more WACO four-place cabin ships than any other American make. With this year's outstanding improvements (*at no increase in price*), we feel safe in predicting the record will hold in 1933.

There's a thought here for dealers on the lookout for larger sales and profits.

May we send complete information on how to get them—with the WACO line for 1933?

THE WACO AIRCRAFT
COMPANY, TROY, OHIO

WACO LEADS IN AIRCRAFT REGISTRATIONS

WACO
AIRPLANES

"ASK ANY PILOT"

AT THE AIRPORTS

National Airport Committee Reports

A COMPREHENSIVE REPORT embodying a nation-wide study of the problem involved in controlling aerial traffic at airports by the Committee on Airport Traffic Control of the Department of Commerce was made public last month. Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, organized the committee in 1929 to make an intensive inquiry into all phases of this subject.

Under the chairmanship of Harry H. Blee, Director of Aeronautic Development of the Department of Commerce, the committee was assisted by subcommittees organized in cooperation with the American Engineering Council at twenty-eight cities throughout the United States. Excerpts from the reports of a number of these subcommittees are included in the document.

"At airports where traffic movements are infrequent or sufficiently spaced," the report said, "experience has demonstrated that the Uniform Field Rules suggested by the Department of Commerce for adoption by airports, supplementing the Federal Air Traffic Rules, are sufficient to preserve order in the traffic flow. However, traffic densities at many of our airports already have reached a point where definite control, involving signaling equipment of various types and a carefully thought-out plan of traffic flow is necessary. With the continued development of air transportation and the consequent multiplication of traffic densities, the need for such control will be still more pronounced."

Topics discussed in detail, and from the technical viewpoint, by the report include progress of landing area design, types of landing areas, general signaling requirements and radio, aural and visual means of conveying information to aircraft for direction of traffic. Appendices give uniform field rules for airports, a description of an air-traffic-control projector developed by the Aeronautics Branch of the Department of Commerce, descriptions of typical smoke generators for wind indication, time studies of airport traffic flow at various airports and a list of subcommittees.

Amphibions, Inc., Opens Headquarters

FOLLOWING A FIRE at Roosevelt Field, Mineola, L. I., N. Y., Amphibions, Inc., has taken over the entire Hangar F. The company is starting construction of three new planes of the Privateer cabin type for spring delivery.

The fire destroyed the main structure of Hangar G, former headquarters of Amphibions, Inc., demolishing four incomplete hulls of the old Ireland type and several privately owned planes in the hangar for service work and storage. Loss totaled $100,000, about three-quarters of which was sustained by owners of the private planes. The office of Roosevelt Field, Inc., and the office and machine shop of the Amphibions company were not affected by the fire.

Akron Airport Reports for 1932

A SUCCESSFUL YEAR for 1932 has been reported by B. E. Fulton, manager of Akron (Ohio) Municipal Airport. In spite of rent reductions to airport concessions, the field showed a financial net profit of almost $200.

During the past year 10,000 passengers passed through Akron, which is served by American Airways and Pennsylvania Airlines. A total of 2,409 passengers boarded and left planes at Akron. Air mail and express transported totaled 21,768 and 2,355 pounds, respectively. These figures represent increases over 1931 of 103% on passengers, 47% on mail and 873% on express.

Air Services, Inc., one of the local operating companies, has flown planes 516 hours, and the Goodyear blimps, flying 950 hours, have carried over 4,500 passengers. About 750,000 people are estimated to have visited the airport during the year. The Goodyear-Zeppelin Corp., the Guggenheim Lighter-than-Air Research Institute and a memorial unit are located at the field in addition to hangar locations and industrial sites.

Detroit Air Mail Center Transferred

ALL AIR MAIL ACTIVITIES in and out of Detroit, Mich., are being concentrated at the city airport. Previously the mail was flown from both Wayne County airport and the city field, but with the inauguration of two services, one to Columbus and the other to Buffalo last month on the American Airways contract, the change was made. The American Airways organization now has all of its Detroit operation centered at the latter field.

Texas Airport Managers Meet

SELECTION of Amarillo, Tex., for the next meeting and passage of a resolution expressing disapproval of action of the national House of Representatives in eliminating all air mail appropriations from the appropriations bill, was the principal action taken in the closing session of the two-day convention of the Texas Airport Managers' Association at Lubbock, Tex., February 3-4. The remainder of the program dealt with operations problems. The next meeting will be held sometime in July. Preston Sneed, airport director of the city of Dallas, Tex., and president of the association, presided.

Airport Shows Large Gains for Year

IN 1932 ship registrations at Rhode Island State Airport, Hillsgrove, R. I., totaled 1,667 as against 295 for 1931. Passengers flying to or from the port in 1932 numbered 9,592, while in 1931 the total was 3,317. In 1932 there were 131 students engaged in actual flight instruction, and in 1931 only 31, which represents an increase of 322.6 per cent. Eighty-seven of these obtained their Department of Commerce licenses in 1932 as against 12 in 1931, showing a gain in this line of activity of 625 per cent. In 1932 21 airplanes were permanently housed at the field, as compared with 11 in 1931, an increase of 90.9 per cent.

In addition, considerable quantities of mail and express were handled as well as aerial photography. During the two-year period in which the airport has been in operation there has been but one mishap at the field involving injury to a person, and that occurred to a student of gliding. Willard M. Fletcher is director of the airport.

Airport Building at Lincoln, Nebraska

AN ADMINISTRATION building is to be erected at the Lincoln, Neb., municipal airport at an estimated cost of $14,400. The plans and estimated cost of the structure have been approved by the Lincoln City Council, and the work is to be awarded in three contracts. The estimated cost of the building is $12,000, with $1,400 being added for plumbing and $1,000 for wiring.

The building will be 40 by 65 feet, fireproof, and will have a small heating plant in the basement. There will be an office in a tower for the port manager. On the ground floor there will be a lobby in the center, an office for the Boeing company, and a storage room. A baggage and check room, a dining room, kitchen and rest rooms will be provided. The building will be constructed of tile with buff colored stucco, brick or stone.

When the Lincoln council approved the plans for the building, arrangements for a five-year lease with the Boeing company were endorsed. The new building is expected to pay for itself over a period of years. In addition to revenue from the Boeing company, the city will derive income from a dining room concession to be let on a competitive basis. The electric current used, including that for the radio plane director, also will be paid for.

Airport Fees Suspended

AN AIRPORT MORATORIUM recently was declared by Yakima County (Wash.) officials on all charges for the use of the county airport.

(Continued on following page)

RELIABILITY

. . . *proved through air line service*

Whenever you fly, look for this Plate

Of the 25,430 air mail miles of the United States, 90% are equipped with the Western Electric Two-way Radio Telephone. The air lines so equipped averaged over 85,000 scheduled radio telephone contacts each month of 1932. More than 95% of these contacts were completed.

No wonder the major air lines of the country make Western Electric their standard. With this equipment, flying is no longer a seasonal method of transportation. Passengers travel with confidence. Pilots fly with assurance. Each group knows that the Western Electric Two-way Telephone is reliable. Experience has proved it. Now more easily installed and maintained and requiring less operating attention, the new Western Electric Aviation Communication systems are more highly valued than ever. For full information on equipment for *your* plane, address Western Electric Company, Dept. 278 AD, 195 Broadway, New York.

Western Electric equipped: American Airways, National Parks Airways, Northwest Airways, Pennsylvania Air Lines, Transcontinental and Western Air, United Air Lines, Western Air Express.

Western Electric*

Aviation Communication Systems

MADE BY THE MAKERS OF BELL TELEPHONES

**Northern Electric in Canada*

(*Continued from preceding page*)

United Airport Reports 1932 Traffic

AIR TRAVEL in Southern California jumped 138 per cent in 1932. As a result of this gain, United Airport, Los Angeles terminal for five of the six major airlines serving this territory, has reported heavy traffic activities for the year.

With thirty scheduled transport planes arriving and departing daily, a total of 23,580 line passengers passed through the port last year. The total of all persons flying in and out was 134,688. Take-offs and landings during the year were 58,930.

Airport to Continue Operations

AGREEMENT was reached on February 7 between S. B. Alexander, who recently purchased the Charlotte, N. C., airport at a foreclosure sale, and directors of the Charlotte Airport Corp., now in the hands of a receiver, whereby continued operation of the airport for the next five years is assured. Under the agreement, Mr. Alexander promised to extend the payment on principal and back interest on the $90,000 first mortgage he holds on the property on provision that the corporation pay the cost of taking the company out of receivership and place money in escrow to guarantee payment of interest and taxes. It has been estimated that it would require $15,000 to take care of the operating deficit for five years. The stockholders voted bonds to this amount.

Airport Truck for Handling Planes

ARDUOUS HAND WHEELING of ships from hangars has been eliminated by Council Bluffs (Iowa) Airways through a special truck designed by the president, J. G. Coulter.

An outrigger of angle iron is suspended from the front end of a light automobile whose wheelbase has been shortened to facilitate turning. The outrigger is raised or lowered from the driver's seat by a special lever arrangement. A hook in the front part of the outrigger bar picks up the tail of the ship by a specially designed eye fastened to the airplane. This eye can be attached to either the tail skid or the fuselage frame, according to the craft's design. For foreign ships not equipped with the eye, an old tractor brake drum is bolted to the rear of the truck. This forms a pan in which the tail wheel can be set. For emergency use, the machine is equipped with fire extinguishers and first-aid equipment.

Florida Airport Site Donated

A SITE for a municipal airport has been donated to Panama City, Fla., by Mr. and Mrs. J. B. Atkinson. The plot of land consists of 282 acres and, located facing the water front, it will be suitable for both land and sea planes. Streets are to be laid from the town to the field, and federal funds will be sought to put the field in shape for opening.

Pennsylvania Field's Name Changed

THE NAME of the Hazleton, Pa., airport formerly known as Veale Airport has been changed to Reifenberg Airport. The field is located at St. Johns, Pa., six miles north of Hazleton.

Roy Hunt Transferred to Oklahoma City

THE AIRPORT at Norman, Okla., is to be closed and its activities removed to the Oklahoma City municipal air terminal, Roy Hunt, Norman speed and stunt pilot, has announced. Mr. Hunt has been placed in charge of all flying equipment for the Oklahoma Aviation Service, Inc., which owns one of the hangars at the Oklahoma City terminal.

Birmingham Airport Manager Honored

STEADHAM ACKER, manager of the Birmingham, Ala., airport, last month was named national chairman of the airport section of the Aeronautical Chamber of Commerce of America. He succeeds George W. Orr, president of Roosevelt Field at Mineola, L. I., N. Y.

Newark Airport Report for 1932

TRAFFIC at the world's busiest air transport center, Newark (N. J.) Airport, continued to give it first place during 1932. According to the commerce bulletin of the Port of New York Authority, airliners transported 91,559 passengers on scheduled trips and carried 1,521,559 pounds of mail during the year. Transport ships made 39,272 landings and take-offs in that period, a daily average of 107.

Air Sign Erected on Boardwalk

BRIGANTINE, N. J., claims the distinction of having the only direction and distance air marker painted on a boardwalk. The sign, painted by the Brigantine Chamber of Commerce, was designed by President Erwin L. Schwatt of the Atlantic City Aero Club.

United Adds to Newark Equipment

THE PENNZOIL CO. has provided United Air Lines' Newark station with a new oil wagon of sixty gallons' capacity and equipped with a rotary pump with a flow meter in the line, graduated in pints.

Rating Given Framingham, Mass., Field

A NO. FOUR COMMERCIAL RATING has been granted the Framingham, Mass., airport. Commercial operations from the field are now being conducted by a newly organized company, Air Services of Framingham. They are using a J-6-240 Cessna and a Kinner Fleet in carrying on charter work and student instruction.

Minneapolis Field Has 1932 Gains

ACCORDING to L. D. Hammond, director of the Wold-Chamberlain municipal airport of Minneapolis, Minn., 16,761 planes and 65,758 passengers, representing increases respectively of 10.8% and 51% over 1931, were recorded in and out and made sightseeing and other flights during 1932.

Idaho Airports Improved

FINANCING has been secured for the erection of a hangar, 60 by 60 feet, at McCall, Ida. The money for the material has been raised by public subscription at McCall and Warren, Ida. The landing field at Warren has been completed and is in shape for planes equipped with wheels as well as skis in the winter.

Love Field Air Traffic Grows

STEADY GROWTH of air activity at Love Field, municipal airport of Dallas, Tex., is proved by the report of Airport Director Preston Sneed for the last three months of 1932, showing 16,520 passengers using the field, as compared to 13,981 for the same period of the preceding year. Plane schedules for the period totaled 8,225 in 1932 and only 7,610 in 1931, and visitors to the port more than doubled, numbering 318,000, compared to 140,000 the preceding year.

Activities toward the beautification of Love Field are under way, according to the director. Promise of cooperation from the Junior Chamber of Commerce and the American Rose Society, through R. A. Gilliam in Dallas, have been received by airport officials. One of the projects towards beautification is the establishment of public rose gardens.

Improvements at Lindbergh Field

THE CONSTRUCTION of modern new buildings, including an administration center and large masonry and steel hangar by the Ryan School of Aeronautics at Lindbergh Field, San Diego, Calif., and the resultant increase in airport activity from the school's student training has necessitated additional improvements at the city's municipal airport. New paved runways have been installed and the former ones increased in length. Several hundred square yards of macadam aprons also have been completed near the new Ryan buildings.

Under the direction of the municipal harbor department, which controls the operation of Lindbergh Field, palms have been transplanted around the Ryan administration building. A special beacon flashing the code signal SD also has been installed on top of the four-story Ryan tower. Steel and wire fencing and glass canopies prevent spectators from walking on the airport and protect passengers as they enter and leave the commercial airliners.

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"Airports and Established Landing Fields in the United States"

1933 EDITION

FEATURES:

1. Approximately 200 pages descriptive of the leading airports of the United States which includes communications, service facilities, storage rates, operations, miscellaneous, and in addition a reproduction of an AERIAL PHOTOGRAPH retouched to show size, location, altitude, type of surface, length of runways and obstructions.
2. Over 80 pages of State maps showing cities and towns having airport facilities together with a brief outline of State laws and regulations.
3. A 40 page section giving a complete description of all airports and permanently established landing fields in the United States. The information in this section compiled from data received from the Department of Commerce, State Directors of Aviation, local Chambers of Commerce, and other interested local organizations. The greater percentage of this information has been field checked by the publishers.

THIS DIRECTORY IS NOT ONLY VALUABLE TO EVERY ONE CONNECTED WITH THE AVIATION INDUSTRY BUT SHOULD BE IN THE LIBRARIES OF CHAMBERS OF COMMERCE AND AVAILABLE AT HOTELS FOR USE BY TRANSIENT PILOTS.

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. AIRLINES and AIR TRAVEL .

Airline Statistics for 1932

AMERICAN - OPERATED AIRLINES carried 540,681 passengers during 1932, an increase of 18,000 over the previous year, it was announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Air express also increased in volume, but air mail declined during the year.

Of the total number of passengers carried, 474,279 traveled on the domestic airlines and 66,402 on American-operated airlines extending into Canada and Latin America.

Air express amounted to 1,600,821 pounds in 1932, as compared with 1,151,348 pounds in 1931. The 1932 total included 1,033,970 pounds of express transported on domestic airlines and 566,851 pounds on foreign extensions.

Air mail carried on the domestic lines has been reported by the Post Office Department to have been 7,393,257 pounds in 1932, as against 9,097,411 pounds in 1931. The compilation for foreign air mail has not yet been completed.

Miles flown by all operators in 1932 were 50,932,967, as compared with 47,385,987 in 1931. Passenger miles flown totaled 146,552,587 in 1932 as against 119,968,577 in the preceding twelve months.

A tabulation of combined domestic and foreign operations on American-operated airlines for 1932 as compared with 1931 follows:

	1931	1932
Miles flown..............	47,385,987	50,932,967
Passengers carried.......	522,345	540,681
Express (lbs.)....	1,151,348	1,600,821
Mail (lbs.).............. .	9,643,211	Figures not available
Mail payments	$26,884.043.57	$26,234,321.16
Passenger miles flown..	119,968,577	146,552,587

Eastern Air Takes Over Ludington

TWO PROMINENT EASTERN AIRLINES were united, it was announced last month, when Eastern Air Transport, Inc., acquired the assets used in the operation of the Ludington Airlines, Inc. Eastern Air Transport, a subsidiary of North American Aviation, Inc., operates a mail and passenger service between New York and Miami, while Ludington Airlines has operated for two and one-half years a service carrying passengers and express between New York and Washington on frequent schedules. In addition, it has operated a service between Washington and Norfolk, Va., and between Washington and Nashville, Tenn.

Full previous operations of both lines will be maintained except for the Ludington service between Washington, Langley and Norfolk. The Eastern Air Transport service from Washington to Richmond, Hopewell and Norfolk will continue. Equipment to be maintained will include Stinson trimotors for use on the Ludington division and Fords and Curtiss Condors and Kingbirds on Eastern Air Transport schedules. Rates are not materially affected, and ticket offices and agencies will be maintained as before.

Houston Observes Air Mail Anniversary

THE FIFTH ANNIVERSARY of the inauguration of air mail services into Houston, Tex., was observed February 6. The ceremonies, which took place at the municipal airport, were held under the auspices of the aviation committee of the Houston Chamber of Commerce.

Air Mail Lines Extended

SEVERAL AIL MAIL SERVICES were ordered opened last month by the Post Office Department. Among the new air mail routes the following were to be inaugurated: Detroit, Mich., to Columbus, Ohio, via Toledo; Detroit to Buffalo, N. Y., via London, Ontario; Albany, N. Y., to Boston, Mass., via Springfield; Muskegon, Mich., to Milwaukee, Wis.; Indianapolis, Ind., to Louisville, Ky.; Louisville to Evansville, Ind.; Columbus, Ohio, to Chicago, Ill., and Los Angeles, Calif., to Oakland.

Acme Photo

High-speed all-metal Wright Cyclone-powered transport plane, designed by Gerald Vultee, being tested at Glendale, Calif.

New Boston-to-Albany Line Opened

INTERCITY AIRLINES last month inaugurated a direct airline from Boston, Mass., to Albany, N. Y., via Springfield, Mass., in one hour and forty-five minutes. These Boston planes will connect there with the regular airlines between New York and western or Canadian points. Six-place Travel Air cabin ships are used.

Intercity Air Lines has maintained regular three-a-day passenger service both ways between Boston and Springfield for over nine months. Leaving Boston Airport at 8:30 a. m., the Albany plane arrives at Springfield at 9:25, leaves Springfield at 9:30 and arrives at Albany at 10:15. Returning, the plane leaves Albany at 10:30 a. m., arrives at Springfield at 11:10, leaving at 11:30 to arrive at the Boston Airport at 12:20 p. m.

Transport planes of the airline now leave Springfield for Boston at 8:30 a. m., 11:30 a. m., and 5:30 p. m. daily. Planes for Springfield leave Boston at 8:30 a. m., 1 p. m. and 5:30 p. m.

Night Passenger Service Opened

NORTHWEST AIRWAYS, INC., inaugurated a night passenger service last month. Connections are made at Chicago with United Air Lines to and from New York. At the Twin Cities connections are made with the planes on the Duluth, Minn., and Pembina, N. D., divisions.

Midwestern Airline Shortens Schedules

RAPID AIR TRANSPORT placed a new Lockheed Vega in service last month on their lines, which extend from Omaha to St. Louis via Kansas City. Schedules have been revised so that the flying time between terminals has been decreased about an hour.

Varney Reports Heavy 1932 Traffic

HIGH TRAFFIC PERCENTAGES were revealed in figures for the year 1932 announced by President Franklin Rose of Varney Speed Lines.

For the year, 4,267 trips were flown on the Sacramento division, linking the capital with the San Francisco Bay region, including 118 extra trips made necessary by extraordinarily heavy demand on particular days. Passengers carried were 16,204 A total of 63.3 per cent of all seats available were occupied.

The showing on the Los Angeles division, connecting that city with the San Francisco Bay region, was 67.1 per cent, with 2,367 trips flown, including sixty-three extra trips, and 9,533 passengers carried.

(*Continued on following page*)

GOODRICH DE-ICERS PERFECTED on TWA planes....!

Wayne Williams, TWA mail pilot, with Goodrich De-Icer equipped Northrop No. 1. Note specially treated rubber spinner cap and covering that keeps propeller units in balance under icy conditions.

Combined experience of "The Lindbergh Line" and Goodrich Laboratories solves ice problem

WORKING together in the interests of aviation, Transcontinental & Western Air, Inc., Eclipse Aviation Corp., and Goodrich have solved the problem of ice formation. Through the Goodrich DE-ICERS, mail planes can now maintain uninterrupted schedules . . . transport planes can carry their passengers with every assurance of safety . . . in the worst kind of icy weather.

Mr. Jack Frye, Vice-President in charge of operations, Transcontinental & Western Air, Inc., says: "The Goodrich De-Icers installed on all Transcontinental & Western Air, Inc., Northrop mail planes have enabled completion of mail schedules under icing conditions which would have prevented operation of planes not so equipped.

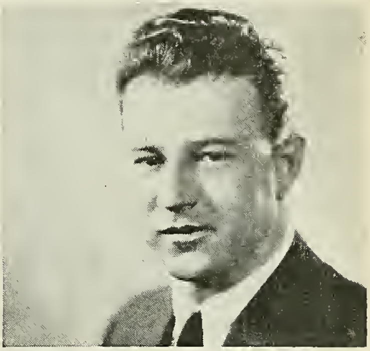
"We are convinced that De-Icers are a practical means of eliminating ice from transports," Mr. Frye continues.

What are De-Icers? . . . Thin sheets of rubber containing long inner tubes cemented to the leading edges of wings and tail surfaces. A valve, operated by the pilot, releases compressed air into these tubes and causes them to expand and contract automatically. The ice, which is cracked loose by this "breathing" action, is ripped off by the air stream as fast as it is formed.

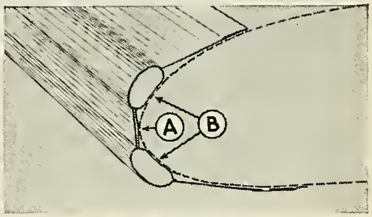
For further information on Goodrich De-Icers or Airplane Tires, write the Aeronautical Sales Department, The B. F. Goodrich Rubber Company, Akron, Ohio.

Goodrich DE-ICERS

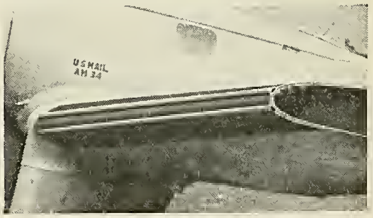
Made by the Makers of Goodrich Airplane Silvertowns



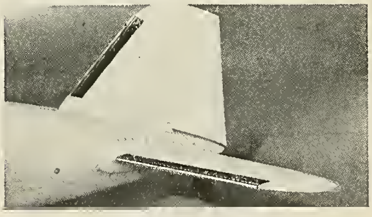
"We are happy to have worked with Goodrich," says Jack Frye, Vice-President in charge of operations, Transcontinental & Western Air, Inc., general offices, Kansas City, Mo.



ACTION OF THE DE-ICER: Tubes marked "B" inflate, then deflate. Tube "A" inflates while "B" is deflating, then deflates. Pulsation rate is about 1 per minute.



Outside tubes inflated (*cross section shown*)



De-Icers on tail surfaces

First of the Curtiss-Wright Condors to be delivered to Eastern Air Transport

(Continued from preceding page)

Airline Buys Another Stinson

THE PURCHASE of an additional tri-motored Stinson airliner was announced recently by H. S. Martin, president of Pennsylvania Airlines, Inc. This plane, which is the third to be added to the company's fleet in as many months, is equipped with the latest radio installation, as well as complete blind-flying instruments, including artificial horizon and directional gyro.

Pennsylvania Airlines officials stated that the company is increasing its equipment in response to a growing demand for air travel between Cleveland, Akron, Pittsburgh and Washington. Air travel among these cities has continued exceptionally well during the winter, a considerable increase being noted over 1931.

National Parks Line Reports for 1932

A TOTAL of 2,399 passengers was carried by the National Parks Airways along its route from Salt Lake City, Utah, to Great Falls, Mont., according to the 1932 report of the company.

There were 2,028,000 pieces of air mail carried on the line during the year, approximately 500,000 less than in 1931. Air express shipments, however, made an increase from thirty-five packages in 1931 to 688 in 1932.

Every plane in the company's service was completely rebuilt during the year. A total of 729,754 miles was flown by pilots along the route, an increase of 93,890 miles over the 1931 total.

New Boeings Enter Service This Month

FOLLOWING the placing in service of the first new Boeing transport, the twin-Wasp ten-passenger metal low-wing monoplane on the Seattle-Portland section of United Air Lines' Pacific Coast airway, the air transport company this month will place new type transports on the Cheyenne-Pacific Coast and New York-Chicago divisions of its coast-to-coast airway, to familiarize pilots on these divisions with the planes, preparatory to inauguration of new Pacific-Atlantic schedules that will represent a radical reduction of present multi-motored coast-to-coast schedules.

United Air Lines will re-equip its New York-Chicago-Pacific Coast route at the rate of ten new transports a month, the production schedule of the Boeing Airplane Co. The company will then place the new type planes on all other divisions of its nation-wide network of airways.

Pan American Reports Year of Advances

COMPLETION of final links in a 25,500-mile system of airways, reaching from Alaska, at the Arctic Circle, to Argentina, at the opposite end of the hemisphere, to link the United States with aerial trade routes to thirty-one countries and colonies, marked the progress of the international air mail lines of the Pan American Airways System for the year just ended. In the face of critically limited commercial activity which seriously affected all other forms of communication and transport, the international airlines set new high records for volume of mail, passengers and express carried during the past twelve months, while definite engineering progress was made toward advancing the project of regular air mail service over the great ocean trade routes, it also was revealed in the annual operations reports of the Pan American Airways System.

During the year, 5,400 miles of airways were added to the international system. All American airlines operating beyond the borders of the United States were coordinated into this system

Although hardly more than four years ago the United States had only one airline, ninety miles in length, reaching beyond its borders, today, the report shows, a 25,547-mile network of highly developed airways, beginning at Miami, Fla., and Brownsville, Tex., crosses and encircles the entire Caribbean Sea and swings around the continent of South America to cut transport and mail time to a fraction of the weeks formerly required. Pan American had a Post Office Department efficiency record for 99.57 per cent of all trips completed on schedule for the year.

An average of 5,248 passengers a month traveled the Pan American routes between this country and the West Indies, Central and South America, an increase of nearly 2,000 passengers a month over the 1931 record. Passenger miles flown exceeded 3,500,000 for the twelve months. Of the total passenger volume, 78 per cent was commercial. Tourist travel by air is showing substantial gains, and during the last month of the year additional planes were put on the routes to Havana, to Nassau and to the West Indies to care for this type of traffic. Contracts were negotiated by Pan American with the Western Union and Postal Telegraph companies whereby the 6,500 offices of the telegraph companies throughout the country are now acting as reservation offices for international air travel.

Though frequency of service under Post Office Department contracts provides an average of only one round trip and a fraction every week over the Pan American routes, these lines had increased mail volume to the point where an average of 3,325 pounds of mail a week was transported. Gains registering 11 per cent to 61 per cent were shown on the long-haul lines, particularly in mail destined to and originating in Brazil, Argentina, Chile and the north coast countries of South America.

Seven countries were added to the international air express list, and this service was in operation to a total of twenty-eight countries by the end of the year. Volume of merchandise carried showed increases, especially during the last six months. By covenant with the twenty-eight governments, Pan American was successful in having a standard airway bill established as the only document necessary in international shipments. Air express registered a gain of 36.9 per cent for the year, and by the end of the period exports were flying between the Americas at the rate of 4,000 pounds a week.

The most significant step taken by American interests toward trans-ocean air service was revealed in recent contracts placed by Pan American for complete engineering work on two super-flying boat types which embody revolutionary improvements in both engineering and performance and both of which will be capable of scheduled trans-ocean operation.

Engineering work on the new ships is being pushed forward in the plants of the Sikorsky Aviation Corp. at Bridgeport, Conn., and the Glenn L. Martin Co. at Baltimore, Md. It is expected that the engineering program, upon which more than 200 engineers and technicians are employed at present, will be completed within about two months.

Photo by Dallin Aerial Surveys, Philadelphia

RCA VICTOR . . . *world's largest manufacturers of radio communication systems*

The RCA trademark has long been the symbol of reliable radio equipment and communication.

Today, the RCA Victor Company, Inc., offers the most efficient and economical equipment for aviation communication—light and compact transmitters and receivers for planes, and as powerful equipment as may be required at the airports is now supplied by the same company which has taken the leadership in all the other branches of the Radio Industry.

In addition to the fine line of standard radio receivers and transmitters specially designed for planes, RCA Victor is prepared to build any type equipment to order.

Get full details from RCA Victor Company, Inc., Aviation Radio Section, Camden, N. J., U. S. A.

RCA Victor Co., Inc.

Aviation Radio Section

"RADIO HEADQUARTERS" CAMDEN, N. J.

• PRIVATE FLYING •

THE AVIATION CLUBS OF MINNESOTA

H. A. LINDBERGH

THERE IS an important place for organized effort in a community to stimulate and follow through interest in aviation. Some places are fortunate in having part- or full-time aviation secretaries in their chambers of commerce and similar organizations. In Minnesota thousands of the citizens have been induced to think of the skyways, and they will be urged to continue to do so during this year, through the efforts of the various aviation clubs.

The leading organization of this type in the state and one of the most active in the United States is the St. Paul Aviation Club. Although it was not formally organized at the time, yet it had its inception when the Ford Reliability Tour included St. Paul as an overnight stop during 1926. When a testimonial dinner was given in 1928 in honor of the late internationally known airline executive and stunt flier, Charles W. ("Speed") Holman, following his winning of the National Air Derby, it was decided to organize a club. "Speed" Holman was the first president, and he was succeeded by the present incumbent, Maj. Ray S. Miller, commanding officer of the 109th Observation Squadron, Minnesota National Guard.

The St. Paul Aviation Club is incorporated under the laws of Minnesota, and the members decided that "to inculcate the spirit of safety as a basic aid to the development of aviation" should be one of its main objectives. The officers consist of a president, first and second vice president, treasurer, secretary and the board of directors, which includes nine members elected at the annual meetings. The board authorizes all expenditures and constitutes the ruling and governing body of the club.

Upstate there is the Duluth Aviation Club, also incorporated, which was organized, with the aid of the St. Paul organization, by a group of men with varying degrees of interest and participation in the aviation industry. Under the direction of President Howard D. Bush, who owns and flies a plane for pleasure, a number of activities were carried out during the past year.

Cloquet's aviation club, among other activities, was sponsor of an air meet to introduce to the public a training plane manufactured in that city. An interest was shown by the various Minnesota cities in each other, and it is planned to continue more intensive efforts along these lines during 1933. Through cooperation among the various organizations more cities will be air marked, possible legislation affecting them will be supported or opposed and aviation will be encouraged to become not only an interesting topic for discussion and something interesting to watch, but it will be something enjoyable and worth while to experience.

Air Trip to Test Photography Process

HEADED by Capt. Ashley C. McKinley, who was photographer of the Byrd Antarctic expedition, a party of four men took off from Curtiss Field, N. Y., last month on a flight to test a new process of color photography for the National Geographic Society. The trip, which will last ten weeks, will cover Cuba, Haiti and jungles of Central America. Besides Captain McKinley, the personnel of the expedition includes O. P. Herbert and Albert Mitten, pilots, and Samuel W. Miller, observer.

Oklahoma Group Fights Tax

A STATE-WIDE ORGANIZATION to oppose any tax on aviation gasoline was formed by thirty Oklahoma aviators at the Oklahoma City Chamber of Commerce February 1. C. W. Mason, former supreme court justice, and a private airplane owner, was named president. The entire group appeared before the house of representatives committee in opposition to a bill already introduced providing that taxes from airplane gasoline be diverted for airport improvements over the state. Substitution of a bill exempting aircraft fuel from tax for the proposed measure was asked.

Name of Women's Group Altered

THE RHODE ISLAND Women's Aviation League has changed its name to the Ariwa Club, an abbreviation of Advancement of Rhode Island Women's Aviation.

Club Builds Hangar at Seattle

THE BRYN MAWR FLYING CLUB of Seattle, Wash., has completed the erection of a private hangar at Renton Airport, Seattle. This airport, situated on Lake Washington for the convenience of both land and sea planes, is owned and operated by the Northwest Air Service, Seattle.

Mattern-Griffin Flight Start Decided

JUNE has been chosen as the month in which the new attempt at a 'round-the-world record will be made by James Mattern and Bennett Griffin, trans-Atlantic fliers, it was announced last month. The flight will start from either Chicago or New York in the rebuilt Lockheed in which they made their first attempt at a 'round-the-world record last year.

Women Fliers to Dedicate Headquarters

MRS. AMELIA EARHART PUTNAM will be guest of honor at the dedication of the national headquarters of the Betsy Ross Corps at Kansas City, Mo., March 18. At that time announcement will be made of the first winner of the trophy which will be awarded annually by the organization "to the American woman pilot rendering the most useful service to aviation and to her country during the year."

Boardman and Polando Plan New Flight

JOHN POLANDO and Russell Boardman, former holders of the world's long-distance non-stop flight record, hope to make a flight to regain possession of the record, Mr. Polando announced last month. The new flight would start at the Chicago World Fair. The flight which won them the world's record was made from New York to Turkey and was exceeded last month by the non-stop air trip of Squadron Leader O. R. Gayford and Flight Lieut. G. E. Nicholetts from Cranwell, England, to Walvis Bay, South West Africa.

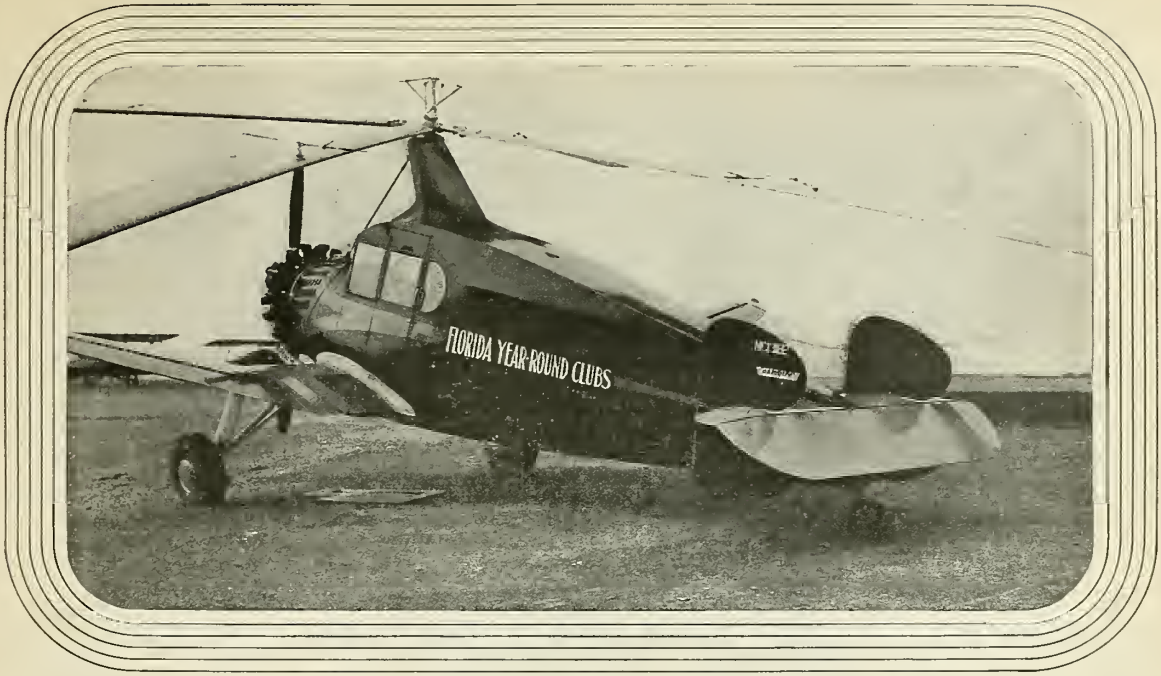
Post Projects World-Circling Flight

WILEY POST, the 'round-the-world flier, announced last month that he will begin late this spring a solo flight over the route followed by him and Harold Gatty on a record-breaking air trip around the world in 1931. He will use the same ship, the Wasp-powered Lockheed Vega, *Winnie Mae,* which was flown on the trip with Gatty. According to news reports, a robot pilot will be installed in the plane to permit Post to devote more time to navigation.

Washington Club Entertains Fliers

RECORD BREAKERS of 1932 aeronautics were invited as guests of honor at a reception and ball by the Aero Club of Washington February 25 at Washington, D. C.

Among those invited and the records for which they were honored were: Amelia Earhart, international women's distance record; Maj. James Doolittle, international landplane speed record; Capt. James G. Haizlip, transcontinental speed record; Mrs. Mae Haizlip, international women's speed record; Mrs. Louise Thaden and Mrs. Frances Marsalis, international women's refueling endurance record; J. K. O'Meara, distance and altitude records for gliders; Col. Clarence Chamberlin, American altitude record for Diesel-engine-powered planes; Miss Ruth Nichols, American altitude record for Diesel-engine-powered planes, and Col. Roscoe Turner, transcontinental speed record.



FOUR PLACE PITCAIRN CABIN MODEL NOW IN DAILY USE AT MIAMI, FLORIDA

Luxurious Comfort added to Autogiro Security

To all the remarkable Autogiro flying characteristics and security this cabin model adds luxurious comfort, quiet, and unusual roominess for four, with ample luggage compartment.

Inherent stability is natural to the Autogiro. Now stabilizing adjustments have been added which afford complete control with practically no physical effort and permit long periods of flight with "hands off."

With a cruising speed *over one hundred miles per hour*, this cabin model also retains the characteristic ability of all Autogiros to fly slowly, hover, and utilize extremely small fields for taking off and landing.

The Florida Year-Round Clubs is using its Pitcairn Cabin for scheduled aerial taxi service between the Miami Biltmore Country Club, the Key Largo Angler's Club, and the Cabana Sun Club. During the first nine weeks 451 passengers avoided inconvenient, time-wasting road travel by utilizing this modern Autogiro service.

For descriptive literature address this company or nearest authorized dealer listed below.

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PITCAIRN
autogiro

OVER 70 AUTOGIROS FLEW MORE THAN A MILLION MILES, TOTAL, DURING 1932

• NEWS OF THE SCHOOLS •

Penn School of Aviation Lowers Rates

REDUCTIONS of from thirty-eight to fifty per cent in the prices of aviation training have been announced by the Penn School of Aviation at its Pittsburgh-Butler, Curtiss-Bettis and Harrisburg airport bases. No change has been made in the standard of training maintained since the school was organized in 1929. Instruction is modeled after the United States Army system, with added personal supervision and attention to each student.

Penn School, a Department of Commerce approved transport flying and ground school, has had a record of no major accidents. All of its students have passed the Department of Commerce flight test. The special blind flying course, inaugurated in the spring of 1932, has been equally successful. All regular pilots of Pennsylvania Airlines, Inc., were trained in instrument and radio flying and without exception passed the Department of Commerce examinations. Another feature of the school is the opportunity offered to ground and mechanic students to perfect themselves in this phase of aviation. This is because the main base is located at the Pittsburgh-Butler Airport, which is the overhaul and repair station for Pennsylvania Airlines.

F. R. Crawford, managing director of the school, stated that the reduction of prices was made possible by the increased purchasing power of the dollar and by the lower costs of materials required in overhaul and maintenance of equipment, together with the increased volume of flying hours expected as a result of the new rates.

Vocational Guidance for Mechanics

AIR TRANSPORT ORGANIZATIONS, aircraft manufacturers, aeronautical associations, engineers, the Aeronautics Branch of the Department of Commerce, the United States Navy and vocational education authorities throughout the country have cooperated in the preparation of a bulletin entitled "Vocational Training for Aviation Mechanics" and released by the Federal Board for Vocational Education.

"Opportunities in Aviation" is the title of one chapter of this bulletin, which calls attention to the fact that while aviation offers unusual opportunities for young men willing to pay the price of success, the need for training for aviation work is just as great as the need for it in other industries. Slipshod work on airplanes, particularly in view of the danger involved in case of the failure of any part of plane or engine while in flight, can not be tolerated. This fact, the bulletin explains, makes it all the more imperative that the aviation mechanic be thoroughly trained in his occupation. It is shown that the more thoroughly and broadly a man is prepared for mechanical work on airplanes, the better are his chances of retention in a job during slack seasons or periods of widespread unemployment. While the specialized mechanic is frequently in greater demand at a large airport, the worker who can do all types of work from minor adjustments to major overhaul is usually in greatest demand in small airports.

Among the topics covered in the bulletin are: Objectives of training programs for aviation mechanics, types of schools offering aviation mechanics' courses, analyses of the airplane mechanic's and aircraft engine mechanic's job, qualifications of instructors in aviation mechanics, training for those already employed in aviation mechanics and cost of aviation mechanics' programs. In addition to many photographs, the illustrations include several plans of model repair shops and sketches of aeronautical personnel organizations.

Attention is directed in the bulletin, which is No. 142 revised of the series published by the Federal Board for Vocational Education, to the fact that the Board is in a position to render complete advisory service in organizing and improving courses in aviation mechanics.

The bulletin may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Night Ground School Stirs Interest

J. R. HARGROVE of the Hargrove Air Service, San Francisco Bay Airdrome, Calif., has reported that the night ground school recently organized by Virgil Simmons of the organization is being attended by eighteen students. This course is for students who have not yet obtained a private pilot's license as well as for those who already have that license and who wish to be schooled in advanced technique of flying. Classes are conducted twice each week on Monday and Friday evenings in a classroom on the second floor of the administration section of the airdrome. The course is scheduled to run for twelve weeks, and the next course will be organized early in April.

Student Fliers to Attend Inauguration

SEVERAL STUDENTS of Roosevelt Aviation School, N. Y., are planning to take off March 3 for Washington, D. C., where they will attend the inauguration of President Franklin D. Roosevelt the following day. The trip will be made as part of the cross-country flight training of the school.

Casey Jones School Adds Course

THE ADDITION of a two-year combination engineering mechanics course to its curriculum has been announced by the Casey Jones School of Aeronautics, Newark, N. J. The course is intended to provide practical training for those who can not afford a four-year university course and for mechanics who wish to acquire a fundamental engineering knowledge. The work will be under the direction of Lee Warrender, vice president and general manager of the school. Walter Hartung, an aeronautical engineer and a graduate of New York University, has joined the faculty and will assist Mr. Warrender in the engineering school.

Aeronautical School Bulletin Issued

A 1933 BULLETIN of the Boeing School of Aeronautics, Oakland, Calif., is now available for distribution to persons interested in aviation training. The new booklet is profusely illustrated, contains detailed descriptive matter and includes a digest of Aeronautical Occupations Briefs, originally prepared for the California State Department of Education. These assist in determining special requirements and personal adaptability for certain lines of endeavor within the aviation industry.

High School Aviation Annex Gains

THE GROWTH of Haaren High School's Aviation Annex, at 215 East 99th Street, New York, N. Y., is attributed to the increased interest in aviation among pupils of high school age. This semester the City of New York has placed the annex on double session. Haaren, one of the first public schools in the country to recognize aviation and include it in its course of study, now has a registration of 1,433 students in that field and a faculty of fifty-one. It offers a number of aeronautical subjects in conjunction with the regular academic courses found in any high school. These prepare students for ground work in aviation. It covers the theory of flight, airplane construction, design and maintenance, engine repair, rigging and related metal work.

The Aviation Annex is equipped with airplane rigging, engine, wood-working, electrical and sheet-metal shops. It has a number of airplanes and engines with a large assortment of parts contributed by the Army, Navy and representative commercial aircraft corporations. A fully equipped wind tunnel for experimental purposes also is available. On alternate weeks cooperative work is carried on at Floyd Bennett Field, Flushing Airport, Glenn Curtiss Airport at North Beach and Teterboro Airport, all in the metropolitan area.

LEARN A TRADE PROTECTED BY THE GOVERNMENT

Casey Jones' SCHOOL OF AERONAUTICS

DOWNTOWN SCHOOL

LOCATED AT the hub of Newark's transportation system, twenty minutes by tube from New York City. The School's field service station and hangar are at Newark Airport—the world's busiest airport—seven minutes from the downtown school.

"The men who take their mechanical training now will service the world's airplanes in the near future"—Casey Jones

WHEN we opened our School of Aeronautics three months ago, we stated the belief that, "in spite of existing conditions, the youth of America are optimistic as to the future—of the country and of aviation." The reception our school has received justifies that belief. More than seventy students have enrolled in our various courses. To accommodate them, we have doubled our facilities, added to our equipment and increased our faculty to ten men, all experts.

Our plan is endorsed by many of the large operators who are confident—as we are—that commercial aviation is just starting; that it may lead the way to general business recovery; and that the future holds great promise for those who prepare now for a career in aviation. The men who take their mechanical training now will service the world's airplanes in the near future.

This issue of AERO DIGEST proves the need for adequate national defense. Trained airplane and engine mechanics and engineers will be of inestimable value to the government in the event of a national emergency.

NEW ENGINEERING-MECHANICS COURSE

TO MEET the demand for men with practical and theoretical training as both mechanics and aeronautical engineers, we have added to our curriculum a two-year Engineering-Mechanics Course.

Frequently the engineer is well based on theory but lacking in practical mechanical experience. Likewise, the mechanic who wishes to better himself will have the opportunity of doing so if he has a working knowledge of engineering.

This course is offered to those who cannot afford a four-year university course; to mechanics with the necessary education who are interested in engineering, and to those who desire a technical and practical knowledge of aviation.

CASEY JONES SCHOOL OF AERONAUTICS, Inc.

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Please send me literature on your school. I am interested in

☐ Regular Mechanics Course
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Personairlities

By Caldwell

THE AWFUL EFFECTS of a childhood spent among literary surroundings have never been demonstrated more clearly or more sadly than by Lawrence C. Ames and I, both of us brief sojourners, several decades ago, within the practically sacred walls of Newton High School, Newtonville, Mass. Lawrie, I hoped, had escaped the full impact of this undermining literary influence, which I blame impartially on our school's proximity to Harvard, the Cabots and the Lodges, for at an early age he had gone west, where men are men and even radio crooners wear full beards. However, at this late date, when my unfortunate school fellow is, like myself, nearly in his dotage, he reverts to type, recalls his literary upbringing, goes literary, and sends me a poem. It's a good poem, but I refuse to encourage him by printing it. He might write another one, give up his business, and devote himself to poetry. From this fate I must save him. Never let it be said that I let an old pilot who learned to fly in France fall into the gutter of poetry. I'll keep him out of the gutter and toss his poem into it.

Lawrence Ames

Lawrie took to flying and other forms of dissipation in France. But before he went to France he got himself born in West Newton, Mass., in 1897, gradually grew up, got a smattering knowledge in the grade schools and Newton High, where I also was brushing up on culture and getting my start as a literary guy, though I've never degenerated to poetry. The reason Lawrie became a poet and I didn't, was because I went into a pork packing plant, while he went on to Berkshire School and Amherst College. This last proved fatal, and turned him to poetry and bond selling in San Francisco, both deplorable occupations.

The first airplane that Lawrie Ames saw also happened to be the second one I saw, for it was Grahame-White's Farman Pusher, staggering out of the mists that enveloped Squantum, Mass., one foggy afternoon in 1909 or '10. In a recent letter Ames writes: "I had waited from 6 a. m. until afternoon for someone to brave the elements, when Claude said, 'Let's go,' and I witnessed my first airplane flight. I went home nuts to jump off the shed with an umbrella, and have been screwy ever since that first thrill. I tried to raise $45 for a three-minute ride with Clifford Webster at Marblehead, but the family said, 'Thumbs down!' I even tried to join Godfrey Cabot's naval reserve outfit, without any luck. Maybe if I'd been a Lowell instead of an Ames, I could have wangled the back seat of that old Burgess-Dunne crate in 1915.

"A champagne soirée brought me my first flight up near the Chemin des Dames in July, 1917, when I was enjoying a ringside seat from the front of a Ford ambulance. My French pilot enjoyed the bubbly so much that he took me out to the lines in an old Caudron G-4 just to give me a thrill. He did. After shovelling what was left of more than one poor poilu into that ambulance of mine, I decided it might be smarter to go West with a hangover and my boots shined than to go out among the mud and whizzbangs. So eventually I got transferred to Chartres and Avord, got soloed on a ratty 1914 Farman in 2 hours and 40 minutes, and was just young enough to think I knew what it was all about. As a matter of fact, when my instructor told me to take it around alone, I had never made a right turn!

"Then followed the usual line of Sopwiths, Nieuports, Spads, a pair of bars (shoulder bars, not Louie's or the Chatham); occasional French leave to Paris, influenza, Issoudun, and three swell weeks recuperating on porto flips at Nice, until they called me to Paris to help celebrate the ending of hostilities. Generally speaking, a pleasant war for me with no red-nosed Fokkers chasing me in my dreams. Joined the Reserve in 1921 so someone could really teach me how to fly. Spent 1920 to 1923 selling leather in England. Met the right girl in a snowdrift at St. Moritz one holiday and followed her all the way to California to sign her up as a co-pilot. Have acquired two passengers since—boy and girl. Pioneer member of old 47th Squadron at Clover Field, and have been keeping my hand in ever since. Have the distinction of being one of the few old timers who admits he has not yet had 1,000 hours."

Lawrence Ames is now a Captain assigned to Procurement Planning, is President of Western Aviation Supply Co., member of a bond selling firm, and a poet. I'm very glad that someone out of Newton High amounted to something. He flies whenever he can, usually in the Army's ships. He adds: "I hear the new 'boots and belts' crab about the equipment. It makes me smile when I remember the stuff we pushed into the air during Floyd Gibbons' first broadcast."

* * *

FROM THE PEACEFUL hamlet of McGregor, out in Ioway where the tall corn grows, the hard-working hirelings of Postmaster General Top-hat Brown bring me word from Ole Oleson, tabloid-size Scandinavian-American pilot. Ole is back on the farm after seventeen years in aviation that began in the fall of 1915 with the Davenport School of Aviation, owned and operated by one B. S. Cook with a splendid equipment of one Curtiss Pusher and one homemade flying boat, familiarly, even contemptuously, referred to as the Scow. This craft, the Scow, was underpowered with a six-cylinder Maximotor that started only after a shot of ether. Ole began his flying career as custodian of the ether bottle. At the clarion call, "Quick, Ole—the ether!" the nimble youth would leap up, give the perishing Maximotor a shot in the arm, and away it would go.

Ole Oleson

He was known then as the Ether Kid, or more simply as the Kid. As such he got every dirty job on the place, such as wiping down the Maximotor and the Scow, during which he would get so greasy that on one occasion a mechanic tossed him into the rubbish barrel under the impression that Ole was a piece of waste. What made it all the more trying to him was that he had paid $600 for the pleasure of becoming a grease-ball and getting some ten hours of flying instruction up and down the old Mississippi from Davenport to New Orleans. He

(*Continued on following page*)

Left—Isthmian Airways seaplanes fly the canal zone from the Atlantic to the Pacific. Fourth successful year. The view shows part of fleet.

Right—Bob Fogg's base at Lake Winnepesaukee, N. H., where he "brings the plane to the people." Ten years of successful operation has amply demonstrated the value of his slogan "Enjoy Seaplane Safety."

EDO FLOATS

Left—At the "end of steel," near an arm of the Hudson Bay, these Edo-equipped seaplanes make accessible remote mineral regions.

Right—Canada Airways, Ltd., probably world's largest seaplane operators (fleet of over 40) show here Edo-equipped planes at a far Northwest terminal on the MacKenzie River.

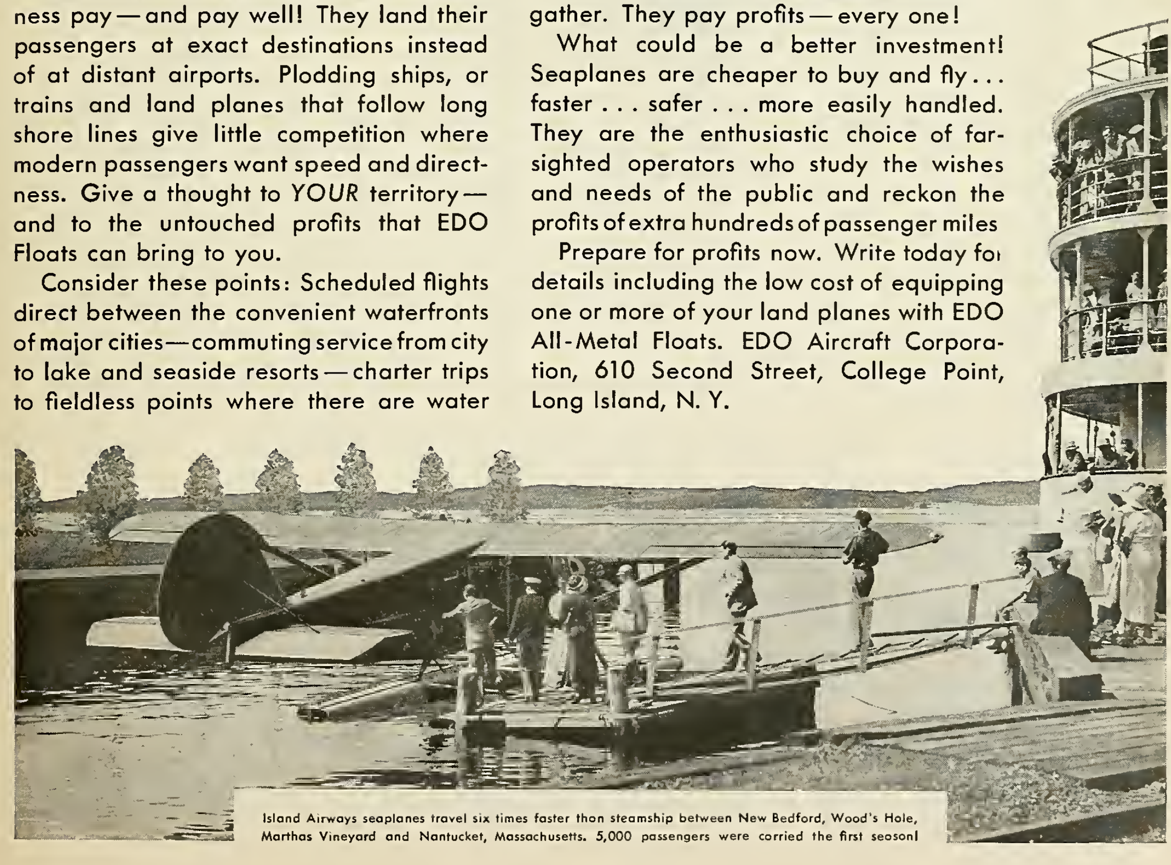
There's PROFIT in water-flying —with seaplanes

JOIN the ever growing list of successful operators who are making the flying business pay—and pay well! They land their passengers at exact destinations instead of at distant airports. Plodding ships, or trains and land planes that follow long shore lines give little competition where modern passengers want speed and directness. Give a thought to *YOUR* territory—and to the untouched profits that EDO Floats can bring to you.

Consider these points: Scheduled flights direct between the convenient waterfronts of major cities—commuting service from city to lake and seaside resorts—charter trips to fieldless points where there are water landing places—short pleasure-flights at recreation centers where people naturally gather. They pay profits—every one!

What could be a better investment! Seaplanes are cheaper to buy and fly . . . faster . . . safer . . . more easily handled. They are the enthusiastic choice of far-sighted operators who study the wishes and needs of the public and reckon the profits of extra hundreds of passenger miles

Prepare for profits now. Write today for details including the low cost of equipping one or more of your land planes with EDO All-Metal Floats. EDO Aircraft Corporation, 610 Second Street, College Point, Long Island, N. Y.



Island Airways seaplanes travel six times faster than steamship between New Bedford, Wood's Hole, Marthas Vineyard and Nantucket, Massachusetts. 5,000 passengers were carried the first season!

(Continued from preceding page)

was a sort of Scandinavian Mark Twain of the air.

In 1916 he went to the Curtiss School at Miami, where he came in contact with Tony Jaquith, Bert Hassel, Harold Kantner. Roger and Tony Janus, and learned to fly under Kantner and Jaquith on landplanes. This association cost him another $1,000, but he emerged with F. A. I. License No. 67 and was thus in line to depart for Kelly Field upon the outbreak of war. Here he took the course and instructed until what is laughingly referred to as peace broke out and changed the war of bullets into a war of bull, tariff fights and debt debates.

Exhibition flying and barnstorming held Ole until the spring of 1922, when he joined the Post Office Air Mail under C. B. D. Collyer, left that to get rich at fairs, picnics, carnivals, corn festivals and other gatherings for homeless and hopeful pilots until 1926, when he returned to air mail under the contractors, first with Colonial and then with Thompson Aeronautical Corp. from 1927 to 1929. Ole used to push Stinsons and other land craft between Cleveland and Battle Creek while I was splashing about with the Loening Ducks in Lake Erie between Cleveland and Detroit. Ole carried mail, and I carried mostly bootleggers until I finally stopped in the lake about halfway between those cities with a loud and very startling splash.

After 1929 Ole came to New York to take a private flying job for a sportsman who flew to his hunting and fishing. Ole flew him up to the Labrador north of latitude fifty in pursuit of the elusive salmon, all over Eastern Canada both hunting and fishing, and down to Cuba, Bermuda, the Bahamas and Jamaica. For over two years Ole was practically a sportsman pilot, with the advantage that he got paid for being one. Finally, with Dr. Hoover's prosperity corner sliding off into the distance, Ole found himself a sportsman pilot in very fact. That is, he could still fly, but nobody paid him anything for it. Unlike Pete Brooks, Ole didn't go for this in a big way. Instead he went back to the farm to rest until the depression blows over. When it does, he'll be back. I certainly hope he isn't too old by that time.

Writing by the light of an old lamp, with a draft from the kitchen door gently swaying his long white whiskers, Farmer Ole writes: "Here I find myself back where I started from in my little home town surrounded by hills covered with two feet of snow, with the Mississippi a ribbon of ice 20 inches thick, with the cellar full of all the good things, with a roaring fire, a good apple and a good glass of cider. I'm so far back in the sticks that the woodchucks carry the mail, and hoot owls go to roost with the chickens. There's fine skating, finer coasting and excellent skiing. Am I foolish? I think not. I have a good farm to go onto in the spring, and I have already made up my mind as to the kind of chickens I am going to raise. There is a section (640 acres) for them and me to run on; we are sitting tight until something changes."

* * *

C. DON BOWYER, now instructing with the United Air Service at Floyd Bennett Field, was born in Lima, Ohio, July 24, 1900. After Lima, Ohio, even Barren Island is a step ahead. Just what Bowyer did for his first 18 years, deponent doth not say, but 1918 finds him in the United States Marines, and off to sea to see the world. He saw enough of it to get out of the Marine Corps in 1923 as a Sergeant, which is about the most hardboiled rank there is, if we can believe the movies. The movies, by the way, have done more to boost the reputation of the Marines than the Marines have ever managed to do for themselves. If only we could have shown Sandino a few movies of Marines in action, that bothersome Nicaraguan doubtless would have been so impressed that he would have surrendered six years ago. As it is, the Marines are surrendering gracefully to necessity, and coming home without him. What the State Department should have done in the first place was to send Ruth Elder down there after Sandino. She always gets her man.

C. Don Bowyer

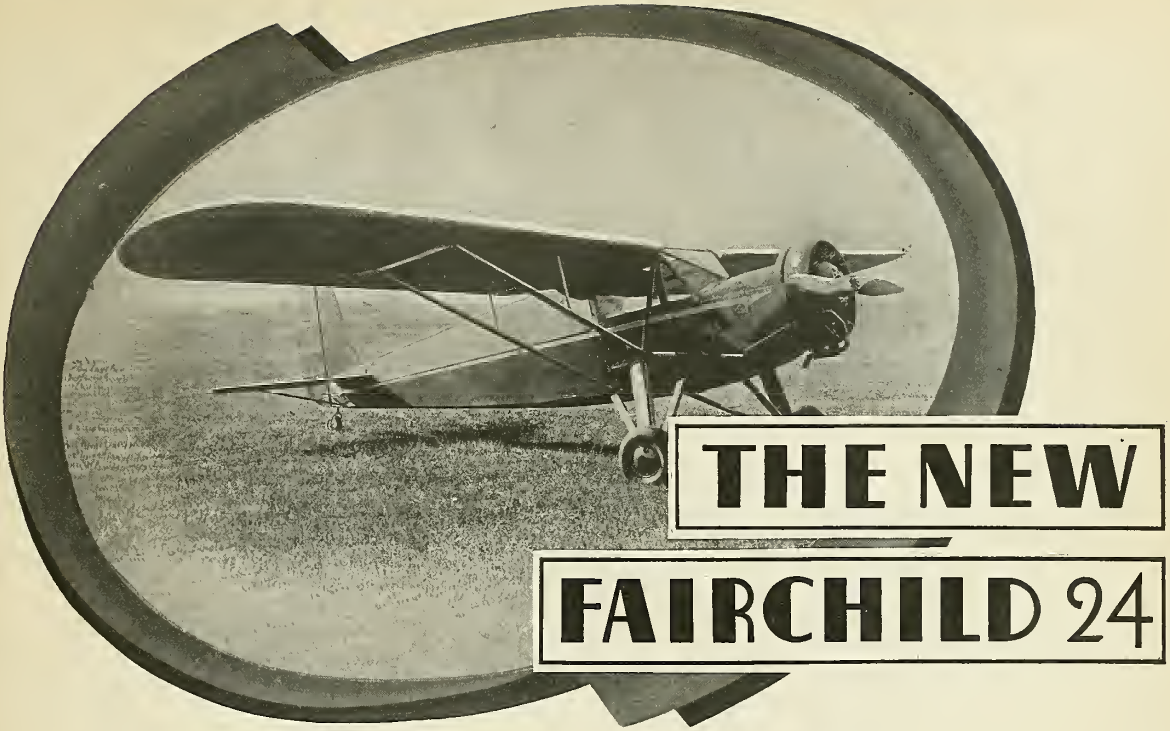
In partnership with the late Frank Sheehan, Don Bowyer, late of the Marines, in 1923 bought three Jennies and went by train to Kentucky to buy a flying field—you can buy a flying field in that state for two gallons of good corn likker. They bought a farm, built a hangar and then started to bring down the ships, when it suddenly occurred to them that they had forgotten to learn how to fly. Captain Halden H. Emerick soon rectified this oversight, after which they flew their ships to Owensboro, Kentucky, and went in for instructing and barnstorming for two years, by which time the Jennies were no more than a memory. After a course at the University of Michigan they returned to Owensboro to build airplanes for nine months, producing in that time six that they named Kentucky Cardinals.

After the death of his partner in a crash, Don Bowyer instructed at Leonard Flo's school near Detroit, at the Barrett Airways, at Armonk, N. Y., and then the following year flew passengers and mail between Newark and Montreal for Colonial Airways. In 1929 he became head of the Atlantic Air Service school at Westfield, N. J., during which time he entered the Miami-Cleveland division of the 1929 National Air Races and was leading the field in a Cessna until he was forced down near Nashville, finishing in second place. Back to Armonk for another year of instructing and then to Mexico went Bowyer to fly passengers and mail between Laredo, Texas, and Mexico City. He flew on that line for six months, often finding his pay quite as easy to collect as the State Department finds the collection of foreign government debts. They kept declaring a moratorium on him, so he headed back to New York, where you don't always work, but if you happen to work you usually get paid for it. In July, 1932, he started with United Air Services at Floyd Bennett Field, the last stop in Brooklyn before diving into the Atlantic Ocean. He's been out there over seven months now, and possibly may have found out why New York City decided to locate the Municipal Airport there. I've never discovered why, myself, although J. Nelson Kelly has explained it to me very carefully.

* * *

THE NOBLE FOWL trying to tear apart the heading of this department is none other than the good old Bald Eagle itself, sketched by the artist in a moment of fury, just after it had been informed that Senator Joseph T. Robinson of Arkansas had made a motion to knock out the entire Air Mail appropriation. From the bird's facial expression, it is more than probable that it would have gone hard with the Senator from Arkansas if that furious fowl had lit on the Senator's head instead of on the word AIR in my title. All of which goes to show that gentlemen from Arkansas should be more careful in future, and not go throwing monkey wrenches into complicated works, that, after all, must be more or less mysteries to gentlemen from Arkansas. Outside of Little Rock, there is very little advanced thought in Arkansas, unless it has progressed rapidly in the three years since I saw it last.

Bill Heaslip, one of our foremost American illustrators, especially of aviation subjects, donated this eagle to me because I lost the albatross heading he made for me two years ago. The cut of that heading was lying on my desk recently when Paul Hewitt came in to see me. The albatross got one look at Paul, uttered a raucous screech, and flew out the window. It has never returned. I don't blame it.



THE NEW FAIRCHILD 24

A 2-place cabin ship typically FAIRCHILD in design and construction, with roomy seats arranged side-by-side—equipped with detachable dual control. The ideal plane for profitable, year-'round student instruction. Endowed with the magically smooth flying characteristics, superb stability and willing response to controls which veteran airplane engineers have given it.

Completely equipped with instruments, all appointments and tools—available with either a Cirrus Hi-Drive or a Warner Scarab engine—the FAIRCHILD 24 is head and shoulders above any other plane within $1,000 of its price.

Nothing less than an examination of the FAIRCHILD 24 itself and a demonstration flight can do justice to the outstanding value and performance represented in this fleet ship. Read our descriptive pamphlet—make your appointment—we'll demonstrate wherever you say.

Companion Ship
The FAIRCHILD 22

This open cockpit, two-place tandem, dual control airplane is a worthy companion in every respect to the FAIRCHILD 24. Staunchly constructed to withstand unusual shocks and strains—but light in weight, fast and gifted by experienced airplane engineers with smooth flying characteristics and instant response to control. Available with either Cirrus Hi-Drive or Menasco C-4 engines. Send for performance data and new low prices.

FAIRCHILD AIRPLANE SALES CORP.
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• THE AIR SERVICES •

Cheney Award for 1932 Announced

PVT. ARDEN M. FARLEY, of the 94th Pursuit Squadron at Selfridge Field, Mich., has been designated the outstanding hero of Army Air Corps activities for the year 1932 and will receive the Cheney Award, which is given annually for "the outstanding act or acts of valor, self-sacrifice or extreme fortitude in a humanitarian interest in connection with flying." The award consists of a bronze plaque with the recipient's name engraved thereon, an engraved certificate describing the act and a substantial cash award. Officers and enlisted men of the Air Corps or Air Corps Reserve are eligible to receive it.

The act of valor for which the award was made occurred on December 6, 1932, near Pontiac, Mich. Private Farley was riding in the gunner's seat of a two-seater pursuit airplane, with 2nd Lieut. William H. Dum, Air Corps Reserve, at the pilot's controls. The plane was damaged in a forced landing. So hard was the impact that the streamlined head rest was crushed down on Private Farley's head, and he barely managed to escape from the wreckage. Flames broke out about the engine as he regained his feet. Lieutenant Dum's head and shoulders were visible in the overturned cockpit, but his parachute had jammed in the seat, preventing his escape. Farley, although injured, crept beneath the wreckage, unfastened the leg and chest straps of the lieutenant's parachute harness and struggled until the pilot was liberated. Together they rose to their feet, ran from the airplane, which was ablaze, and gained safety just before the fuel tanks exploded.

Army Receives Frank Luke Trophy

THE FRANK LUKE TROPHY has been presented to the War Department by the Phoenix (Ariz.) American Legion. This trophy will be presented annually to the West Coast pursuit pilot having the highest score in his annual gunnery record firing, and is in honor of the famous "Balloon Buster" of World War days, whose home was in Phoenix.

Barksdale Field Dedicated

FIFTY THOUSAND PEOPLE at Shreveport, La., February 2, celebrated the dedication of the Army's $6,000,000 Barksdale Field. Secretary of War Patrick J. Hurley headed Government officials taking part in the celebration, in which 130 Army planes participated.

The field is part of a 23,000-acre reservation bought by Shreveport and donated for military use. It is named after the late Eugene H. Barksdale, Army pilot. More than 700 officers, enlisted men and their families are now on the reservation, which is to be permanent base for the 3rd Attack Wing, and by next fall the total number of inhabitants is expected to reach 2,500. The landing area is reported to be three miles long and one mile wide. Bids have been received by the Army for a concrete runway.

"Macon" to be Christened March 11

MRS. WILLIAM A. MOFFETT, wife of Rear Admiral Moffett, chief of the Bureau of Aeronautics, Navy Department, has been designated by Secretary of the Navy Adams as sponsor of the Rigid Airship ZRS-5, which is to be christened *Macon*. The ceremony will take place at the plant of the Goodyear-Zeppelin Corp., Akron, Ohio, on March 11. During the launching ceremonies, the *Macon* will be air borne within the hangar for the first time. The launching ceremony will precede by approximately two weeks the beginning of a series of flight trials of the airship. Upon the conclusion of these trials, the *Macon* will proceed to the Pacific Coast and be based at the Naval Air Station, Sunnyvale, Calif.

Planes Featured in Pacific Maneuvers

UNOFFICIAL HONORS were credited to parts of the "black" attacking fleet in Naval Pacific maneuvers last month, according to news reports. Planes from the aircraft carrier *Saratoga* had a prominent role in the "attack" on the Californian coast, succeeding in "destroying" San Francisco and San Pedro by bombs. Planes of the "blue" fleet helped the defense by engaging in sky fights with the enemy and "bombing" the *Saratoga*. About 175 "black" and 150 "blue" planes are reported to have participated.

Airplane Carrier Launched

THE NAVAL airplane carrier, *Ranger*, was scheduled to be launched at Newport News, Va., late last month. The ship is expected to be ready for commissioning next year, it is reported. The House Committee on Naval Affairs recently ordered a favorable report to the House on a bill to increase the limit on authorized appropriation for construction of the carrier from $19,000,000 to $21,000,000.

General Foulois Wins Mackay Medal

MAJOR-GENERAL BENJAMIN D. FOULOIS, chief of the Army Air Corps, is to receive the Mackay medal for making the greatest contribution to aviation during 1931, it was announced at the War Department last month. He received special commendation for leading air maneuvers during that year.

Officer Appointed London Air Attaché

CAPT. JOHN W. MONAHAN, senior instructor of the bombardment section at Kelly Field, Tex., will leave for Washington April 13 for temporary duty before being assigned to the post of assistant military attaché for air in London, England. This will be Captain Monohan's second tour of foreign duty; he served for a time as representative of the Air Corps in Italy.

Smaller Class at Randolph

THE MARCH CLASS at Randolph Field, Texas, will be reduced approximately thirty students from the number reporting for training in the other classes. Four officers, including Capt. William J. Flood, Army balloon expert, have been detailed to take the course, and 165 flying cadets are expected to be ordered to report March 1. Former classes have contained about 200 students.

Guardsmen Report Flying Safety Record

A GOOD RECORD for safe flying was achieved by the 28th Division, Pennsylvania National Guard, in 1932, according to Maj. Victor Dallin, commander of the 103d Observation Squadron, a part of the organization. During 1932 the National Guard fliers made 3,456 flights without mishap. These included 1,770 hours in the air, including 128 hours flown at night.

The best individual record for the year was made by 1st Lieut. E. M. Scattergood, who made 615 flights and spent more than 300 hours in the air. Major Dallin made the next best record, with 441 flights and nearly 230 hours in the air.

General training of the unit showed an increase over former years. A number of night flights were made and considerable co-operative missions were effected with other branches of the national guard units scattered throughout the state. The squadron has eight Douglas observation planes, equipped with radio, photographic and armament equipment. The 28th Division Aviation Armory, located at the Philadelphia Airport, is one of the most modern buildings of its kind.

Blind Flight Training at March Field

PILOTS at March Field, Riverside, Calif., are being trained in instrument flying. An airplane has been equipped with necessary instruments, and it is expected that during the training year all pilots of the field will have the opportunity of receiving this training. In addition to maneuvering the plane by instrument alone, pilots are required to navigate on straightaway and triangular courses.

(*Continued on following page*)

Courage

We believe in aviation.

As manufacturers of lubricants and gasolines, we have been associated with the industry since its earliest days.

It has been our privilege to know and to work with the leaders of aviation in all its fields. We have supplied our products to most of the important transport and manufacturing companies, both here and abroad.

Mobiloil has been used by the Wright Brothers, Glenn Curtiss, Colonel Lindbergh, Admiral Byrd, Air Commander Kingsford-Smith and Sir Hubert Wilkins—to mention just a few—on their most famous flights.

We believe in the future of aviation—because we believe in the leaders of aviation.

Few industries have ever had such problems to face. Few industries have ever faced their difficulties with greater courage, resourcefulness and skill.

Given courage and leadership of such calibre, aviation ought to go forward. Its future should be bright.

We sincerely hope that no radical decisions or unnecessary moves will be made this year, or any year, to hamper or impede the normal healthy growth of a courageous industry.

SOCONY-VACUUM
CORPORATION
MERGER OF STANDARD OIL COMPANY OF NEW YORK AND VACUUM OIL COMPANY

Mobiloil Aero Oils

(Continued from preceding page)

Pioneer Aviator Awarded Flying Cross

POSTHUMOUS AWARD of the Distinguished Flying Cross to the late Eugene B. Ely for helping the development of Naval aviation was announced last month. Mr. Ely was honored for his feat, as a civilian flier, in 1910, of being first to show that a landplane could land on and take off from a ship at sea.

Marine Air Reserve Unit at Seattle

A MARINE CORPS RESERVE aviation unit has been established at the Naval Air Station at Sand Point, near Seattle, Wash., and has been accepting recruits who will ultimately become officers in the Marine Corps Reserve after the necessary training. Lieut. R. C. Mangrum is the Fleet Marine Corps Reserve unit commander. Physically fit college graduates between the ages of 20 and 27 are eligible as recruits for the unit.

Army Orders Planes and Engines

CONTRACTS totaling about $3,900,000 were awarded recently by the War Department for 174 airplanes and twenty-eight special engines and parts.

The largest order, amounting to over $2,000,000, was given to The Glenn L. Martin Co., Baltimore, Md. This included fourteen YB-10 bombers and twelve YB-12 and twelve YB-13 bombers. The planes are mid-wing monoplanes, each powered with two radial 500-horsepower air-cooled engines. Bombs weighing over 2000 pounds are carried within the fuselage. Speeds of more than 200 miles per hour are reported.

Another large order was awarded to the Boeing Airplane Co., Seattle, Wash., for 111 P-26A single-seater low-wing pursuit planes, engineering data and spare parts, costing the Government $1,201,117.50. These planes will be powered with supercharged air-cooled Wasp engines of about 525 horsepower.

The Bellanca Aircraft Corp. of New Castle, Dela., was given a contract for ten single-engine cargo transports, Type C-27A, with complement of spares, in the amount of $275,651. These are large, high-wing monoplanes similar to the commercial Airbus model.

Fifteen O-38E observation planes, with spare parts, costing $174,613.40, were ordered for National Guard use from the Douglas Aircraft Co., Inc., Santa Monica, Calif. These are a refinement of the well known Douglas model, with pilot's and observer's cockpits enclosed.

Twenty-eight Hornet air-cooled engines and spare parts, to be used with the Douglas planes, were ordered from the Pratt & Whitney Aircraft Co., East Hartford, Conn., to cost $157,729.12.

Activities at Brooks Field

NEWLY designed flying suits for high-altitude flying, and oxygen bottles with automatic feeder gauges so that the oxygen necessary to keep the pilot and observer alive at high altitudes is varied according to the height at which the plane is flying have been received by the First Photo Section of Brooks Field, San Antonio, Tex.

Under the direction of Lieut. Robert S. Macrum, photographic officer of the 12th Observation Group, pictures of San Antonio and surrounding territory have been taken at an altitude of approximately 27,000 feet. A Fairchild cabin ship especially designed for high-altitude flying was used. Experiments were carried on with cameras with lenses of various focal lengths.

Construction at Mitchel Field

AS PART of the building program at Mitchel Field, N. Y., bachelor officers' quarters were being completed, engineering shops were already finished and a new headquarters also was ready for occupancy, according to a recent report. An additional appropriation has provided for the construction of necessary roads. Several of the new brick and steel hangars are occupied, and others are nearing completion.

Seventeen Army Planes Fly to Panama

LT.-COL. JOHN H. PIRIE commanded a flight of seventeen Army airplanes which left Duncan Field, San Antonio, Tex., recently for France Field, Panama Canal Zone. The planes replaced ships formerly in service in the Canal Zone.

Hawaiian Force Devises Aids

VP SQUADRON ONE of the Fleet Air Base, Pearl Harbor, Hawaii, has solved two problems in connection with aircraft handling and operation.

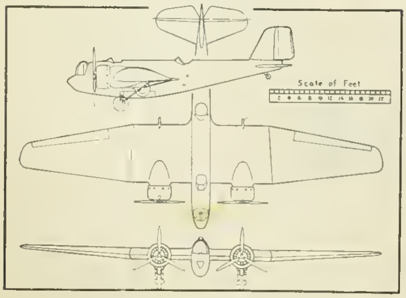
The first problem solution is a compass rose for swinging patrol planes on wheel-type handling gear. Two circles are painted on the compass rose as laid out on the concrete apron. The diameter of the inner circle is equal to the tread between the side wheels and marks their proper tracks. The radius of the outer circle is equal to the distance from the center of the tail wheel to the axis of the side wheels and marks the track for the tail wheel. If the plane is towed accurately onto the rose and the tail wheel is turned so that it is perpendicular to the fore-and-aft line of the plane and is kept on the outer circle during the swinging, the plane's fore-and-aft line will always remain over a diameter of the rose. With this new rose, the squadron can swing a plane in 30 minutes, as compared with the two or three hours required formerly.

The second aid is a means for testing and correcting the airspeed meter installation in a plane. While the official airspeed indicator tester is used, the pressure line is disconnected at the Pitot tube and the tester is connected to the line at this point. Thus not only the meter but also the whole line and all joints are tested except for the one which is disconnected.

Anacostia Construction Completed

A NEW barracks, central heating plant and engine test stand are among improvements recently accomplished at the Naval Air Station, Anacostia, D. C. Concrete roads and walks have been built, and the grounds have been landscaped.

In addition to the Naval Reserve aviation unit, VN-6R, a new Marine Corps Reserve aviation unit is undergoing flying training at the field. Capt. Gilbert G. Budwig, Director of Air Regulation, Aeronautics Branch, Department of Commerce, heads the Marine squadron. Fiske Marshall is executive officer, and Lieut. George Marshall, engineering officer. Lieut. James Webb is adjutant and operations officer.

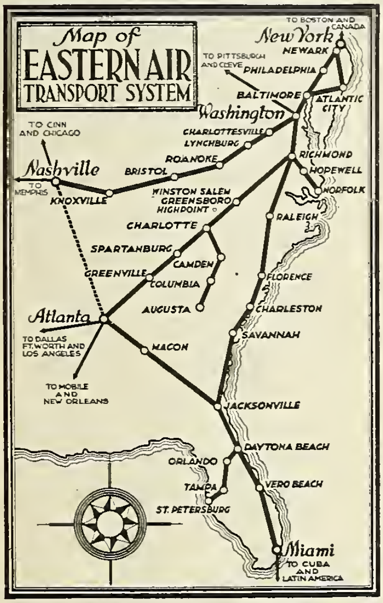


Acme Photo

Three-view outline drawing and photograph of Wright "Cyclone"- powered Martin, reported to be the fastest Army bomber

Look Behind the Map at

EASTERN AIR TRANSPORT



When you look upon the map of an airline you see only the self-evident; the formal business relationship of aircraft to territory. What cannot be seen are the history, the hopes and plans, the varied personalities, the essential circumstances of the company and the men who compose it. You cannot see the passengers—men, women and children, some flying for business, some for pleasure, some in grim races with time and illness or even death. Nor can you see the tremendous importance of some express shipments, yet the materials in flight often mean the difference between life and death, or between an active or bankrupt business. You cannot see the airmail which flies over this route, but letters in pouches, safely locked away in the mail compartment, will start wheels in factories to spinning, save interest charges for banks, cause freight cars or steamships to take on new loads of raw or manufactured materials—or perhaps just tell a family the latest news of one of its members far afield.

You cannot see these things, yet all are present. Day in and day out, year after year, Eastern Air Transport has been —and will continue—in its close relationship to the social and industrial life of the nation. This company has grown from a small organization, flying five planes over a route 800 miles long, to the fourth largest air transport line in the world, flying more than 50 airliners to 34 cities on routes totaling 3,100 miles. The company, together with its Ludington Division, has flown a total of 16,500,000 miles, carried 210,000 passengers and more than 3,000,000 pounds of airmail. Yet past development has been but the placing of a foundation; now Eastern Air Transport, in common with other airlines of the nation, is building a transportation system which will become a most powerful ally of commerce and social life.

Eastern Air Transport seeks to serve you. It has planned carefully, operated conservatively, worked hard to do so. It has expended huge sums on engineering advancements, communications facilities, modern airliners and ground equipment in order to do its best job in serving you and preparing for the future.

EASTERN AIR TRANSPORT SYSTEM

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NEW EQUIPMENT and METHODS

STELLITE CUTTING TOOL

ONE OF THE impressive demonstrations at the recent National Metals Exposition at Buffalo, N. Y., was that of a cutting tool in operation while kept constantly at a bright red heat by an oxy-acetylene flame.

The demonstration was given to show the property of red hardness of Haynes Stellite J-Metal, a non-ferrous alloy of cobalt, chromium and tungsten, of which the cutting tool, .4 by .5 inch, was made. The material machined was a hot rolled steel billet, 5 inches in diameter and 16 inches long, with .15 to .20 per cent carbon and .30 to .60 per cent manganese. The depth of cut was .025 inch, the feed .004 inch and the speed 130 surface feet per minute. After 16 hours of continuous cutting, the tool was removed, cleaned up with a stone, and put into service again.

The red hardness of Haynes Stellite is due to the fact that its base is cobalt, rather than iron or any other metal. The test also indicates the value of Haynes Stellite in the form of welding rod as a hard-facing material on parts used in operations involving heat and abrasion.

AIRCRAFT ENGINE PRIMER

THE IMPERIAL BRASS Manufacturing Co., of Chicago, Ill., has developed an aircraft primer embodying the same construction as the automobile primer which the company has been manufacturing for years.

The aircraft primer is offered for all types of engines in single- and twin-engine and trimotor planes, with or without auxiliary leakproof shut-off cock. Special attention has been paid to the design, both in attractive appearance and from a utility viewpoint.

Cup leather washers are held outward by internal expanding spreaders, which patented construction is designed to give 40% more delivery of gasoline. The plunger has a positive needle valve shut-off feature, eliminating the necessity of the usual auxiliary shut-off.

RING GEAR RIVETING ATTACHMENT

A RIVETING attachment for handling ring gears has been developed by The Manley Manufacturing Co., York, Pa. The riveting attachment embodies ease of handling, efficiency and strength of construction. The lower anvils of this attachment are a part of a steel turret which rotates and makes it possible easily to align the size die desired with the corresponding upper rivet die. The upper die is held by a spring in a strong upper arm, or guide, so that the rivet may be placed in position with one hand, assuring perfect alignment. The entire tool is sturdy and may be used on practically any type of press.

INSIDE MICROMETER CALIPER

THE STARRETT No. 700 inside micrometer caliper is designed to measure directly and accurately the dimensions of holes, slots or grooves which are too small for regular inside micrometers. All dimensions between .200 and one inch are within the range of this micrometer and can be measured easily in thousandths of an inch.

This micrometer combines the sliding jaws of a slide caliper and the easy reading thimble and sleeve arrangement of a micrometer caliper. One jaw is fixed, while the other is attached to the sleeve and opens or closes as the thimble is turned. Both jaws are cut away to facilitate measuring in close quarters. The position of the jaws can be fixed and the caliper converted into a fixed gage by a twist of the lock nut. An additional convenient feature is the small knurled extension on the thimble, which spins easily between the thumb and finger and speeds up opening or closing the jaws.

While this new instrument is somewhat different in appearance from the conventional micrometer, it has the same sensitive "feel" in the hand.

OIL-PROOF RUBBER HOSE

THE DEVELOPMENT of a new compound named Paranite G. O. P. (gas-oil-proof) by The Manhattan Rubber Mfg. Division, Passaic, N. J., makes possible production of rubber tubing and hose entirely unaffected by petroleum derivatives. The Paranite G. O. P. compound is a special substance similar to rubber in appearance and physical characteristics. The base compound is a refined hydrocarbon sulphide, Thiokol, which was described in the August, 1932, issue of AERO DIGEST.

Paranite G. O. P. compound has been introduced in oil loading and discharge hose and in tubing to furnish the gasoline supply to the carburetor. The hose is lined with the G. O. P. compound either in pure form or combined with oil-resisting rubber in the proper quantities according to the severity of the service.

ELECTRIC BENCH GRINDER

BLACK & DECKER Manufacturing Co., Towson, Md., has announced a six-inch special electric bench grinder, designed to do all types of bench grinding, tool sharpening, etc.

Balanced rotating parts of the grinder keep down vibration and make for longer life, while rubber feet make it exceptionally quiet. It is easily portable, due to the convenient carrying handle. It is furnished with two grinding wheels, one coarse and one fine, with ½-inch faces. In addition, there are two adjustable tool rests and two adjustable wheel guards, the latter making it possible to grind at any position on the circumference of the wheel. It is finished in enamel and is equipped with a 110-volt 56-60-cycle, single-phase A. C. motor, three-conductor cable attachment plug and a switch in the base.

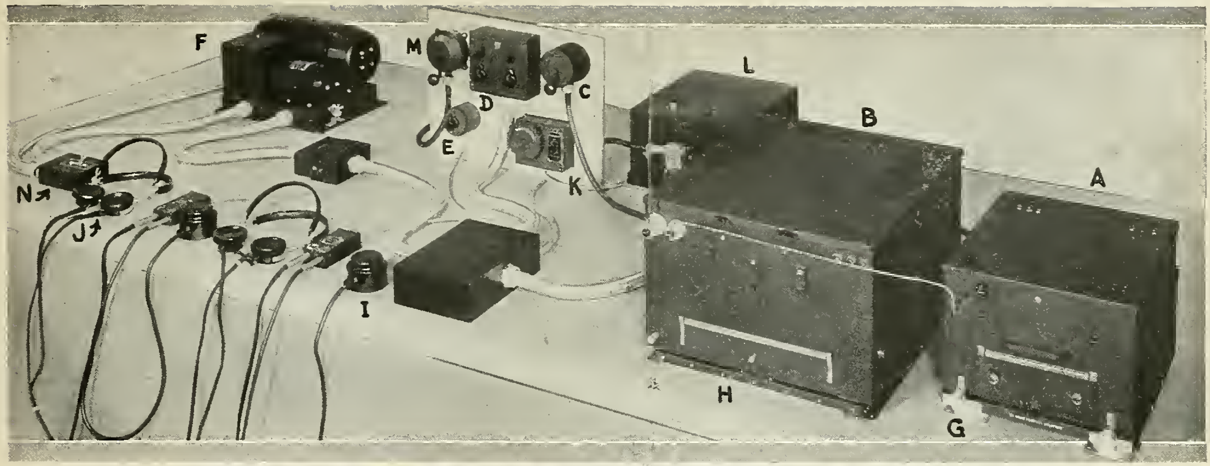
RUNWAY MARKING BY RADIO

THE USE OF underground antennas for radio beacons designating airport runways has been developed by the Aeronautics Branch, Department of Commerce, at its College Park, Md., testing station. Two runway beacon transmitters placed off the field in line with two intersecting runways are required to provide directional guidance along the runways. To prevent duplication of runway beacons, it is necessary to place the runway-beacon transmitter with the transmitting loop antennas underground at the intersection of the two runways and to orient the four beacon courses along the runways, thereby serving all four directions with one beacon.

A pit 10 by 15 by 12 feet deep, lined with concrete one foot thick, was used. Transmitting antennas were of 7 turns each, wound on a frame 8 by 10 feet. The beacon transmitting set, of the double modulation type, delivered one-fourth kilowatt to each loop antenna. A frequency of 335 kilocycles was used for the transmitting set and found to be satisfactory.

With this arrangement, flight tests showed that the distance range was reduced to about one-half of that obtained with the beacon above the ground. A ten-mile range was obtained, however, which was more than sufficient for landing purposes. The courses were sharper with the beacon above ground but could be properly controlled by means of an inductive coupling introduced between the two loop antennas.

When the localizing beacon location is not more than 500 to 1000 feet from the edge of the field, it is believed feasible to locate the beacon transmitting equipment in a house at the edge of the field and to feed radio-frequency power to the two coil antennas in the pit by means of transmission lines such as employed with the



Compact units comprising the newest type Western Electric aircraft radio telephone system

TL-antenna system. In this way the pit may be made somewhat smaller and the transmitting set rendered more readily accessible.

RATE-OF-CLIMB INDICATOR

AN EXPERIMENTAL rate-of-climb indicator has been installed in a United Air Lines plane. This instrument reads from 0 to 2,000 feet per minute ascent and descent. The scale from 0 to 500 feet per minute is graduated in 100-foot marks in such a manner that 500 feet per minute up or down is one-fourth a complete revolution of the dial. From this point the scale has been condensed, though still in 100-foot graduations, in order to obtain the complete reading of 0 to 2,000 feet in one-half a revolution. The object of the instrument is to provide a more sensitive and accurate instrument for use as a level flight or pitch indicator, and a considerably larger movement of the hand is obtained from a small degree of pitch.

RADIO TELEPHONE EQUIPMENT

THE ACCOMPANYING illustration shows the newest type of Western Electric radio telephone equipment for air transport planes. This equipment, which was described in the October issue of Aero Digest, embodies among other refinements a preselected frequency superheterodyne receiver and a new radio transmitter, both of which are arranged for rapid shifting to either day or night frequencies and both stabilized by quartz crystal; a minimum number of apparatus units, complete conduit wiring and an improved side tone circuit which enables pilots to converse with each other.

The units indicated in the illustration are: A—Short-wave superheterodyne receiver. B—Short-wave transmitter. C—Control unit for making the frequency shift. D—Switches which control power to the receivers and the transmitter. E—Control for correcting small drift in oscillator frequency. F—Power unit consisting of a transmitting and a receiving dynamotor. G—Mounting for short-wave receiver. H—Transmitter mounting. I—Close-talking microphone. J—Headset, containing newly developed paper-damped permalloy diaphragms, to prevent bursts of static. K—Volume control for beacon receiver. L—Long-wave or beacon receiver. M—Tuning control for long-wave or beacon receiver. N—Emergency switch to cut off all electric power in the airplane.

The New Hamilton Standard Controllable-Pitch Propeller

IN the ordinary fixed-pitch propeller design there are a number of conflicting requirements making it necessary either to design for one particular type of performance, such as high speed, cruising, take-off and climb or altitude performance, or to design a compromise propeller involving a minimum amount of sacrifice in all-around performance. In addition to the usual conflicting propeller requirements in ordinary airplanes, there are a number of problems peculiar to engines having a high degree of supercharging and airplanes having a very high maximum speed, particularly where this high maximum speed is combined with the use of reduction gearing between the engine and the propeller.

One of the reasons for loss in performance of airplanes is because it is necessary for the fixed-pitch propeller to be so designed and so set that the engine turns at its rated speed in full-throttle level flight. This is necessary to prevent abuse of the engine by speeding and is required by the Department of Commerce and by the engine manufacturers. When the fixed-pitch propeller is designed and used in this way, its characteristics are such that it holds the engine down to about 80% of its normal r.p.m. and consequently about 80% of its normal power output when the plane is standing on the ground at the time of take-off. Thus, the engine normally rated at 400 h.p. could develop only 320 h.p. at the time of take-off. During the climb, this same propeller will hold the engine down to about 85% to 90% of its rated speed so that the horsepower output of the engine during the climb would be around 350.

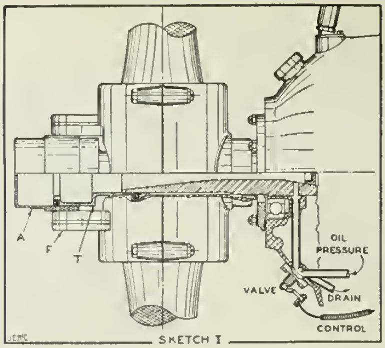
This loss in engine power can be avoided by the use of the controllable-pitch propeller, since the pitch can be adjusted to hold the engine to its rated r.p.m. and power output for take-off and climb as well as for maximum speed and level flight. For the usual type of airplane this is a principal source of gain in the use of the controllable-pitch propeller, and substantially all of this increased performance can be obtained with the use of two pitch settings.

The second feature of performance has to do with the performance of the engine and airplane at altitude. In general, engines have a certain maximum safe speed for cruising and a certain maximum safe power output at that speed of rotation. These limitations on power output are brake mean effective pressure and r.p.m. and are usually set by the engine manufacturer. They apply regardless of the altitude at which the ship is flown. However, variations in air density cause the fixed-pitch propeller to allow the engine to turn at a much higher r.p.m. at high altitude with a given brake mean effective pressure than it would turn at lower altitude. For example, such a propeller at 20,000 feet would turn about 40% faster than it would at ground level. Thus, if a fixed-pitch propeller is set for cruising at the proper r.p.m and brake mean effective pressure at altitude, it will turn too slowly at ground level, causing a loss in engine power available which has to be added to the usual loss in power between the maximum speed of the plane and the conditions of take-off and climb.

For a ship of this kind the two pitch positions may be used very effectively by adjusting the high pitch setting for r.p.m. and brake mean effective pressure to be used at altitude for cruising and by adjusting the low pitch setting to suit the conditions of take-off and climb.

The third important feature of airplane performance is the effect of very high airplane speeds, particularly in combination with the geared engines, on the propeller performance at the time of take-off and climb. The result of high airplane speed, particularly in combination with reduction gearing, is to call for the use of unusually high pitch angles on the propeller blades. These extremely high pitch angles result in very inefficient operation of the propeller at the time of take-off, the action being somewhat analogous to the inefficient flow over the airplane wings at angles beyond the stalling point. This loss in propeller efficiency is added to the loss in engine power output already mentioned. The loss in propeller efficiency from very high pitch angles may be extremely great, sometimes amounting to more than one-third or even one-half in extreme cases.

In airplanes of this kind the use of a controllable-pitch propeller is almost indispensable from the standpoint of safety and performance. As the take-off of such planes without controllable-pitch propellers is quite hazardous, the two-pitch propeller again meets this condition in a fairly satisfactory manner, as the low pitch setting can again be adjusted for take-off and the high pitch setting for cruising. There are additional advantages which may be had from a larger number of pitch settings or from a constant speed propeller in which the propeller pitch is adjusted to hold the engine to constant r.p.m. The greater part of the objective is reached, however, by the use of two positions.



SKETCH I

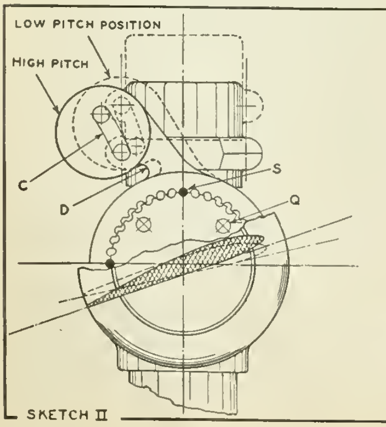
The Hamilton Standard controllable-pitch propeller is of the hydraulically operated type, the oil pressure for pitch changing being obtained from the engine lubrication system. The oil pressure is used only to shift the propeller into the low pitch posiiton. It is shifted into the high pitch position by means of centrifugal counterweights attached directly to the blade ends.

The detail of operation is as follows: An oil-pressure line from the main pressure supply in the engine is conducted to a three-way valve and thence through a collector ring into the interior of the front end of the crankshaft and out through the crankshaft into the pitch-operating cylinder A. The three-way valve shown in sketch I is so arranged that rotation of the valve stem will cause the oil line leading to the propeller to be connected with the pressure supply in one position or with a drain directly into the crankcase in the other position. When this oil valve is thrown into the pressure supply position, the oil flows through the collector ring into the crankshaft and out into the cylinder, causing the cylinder to move forward on the cylinder guide T; as the cylinder moves forward, a self-aligning ball bearing whose inner race is attached to the cylinder at B rolls in the cam slot C in the counterweight bracket D. As the bearing rolls in this slot, it causes the counterweight to move inward toward the crankshaft axis, and as the weight moves inward, it forces the blade to which it is attached to go into the low pitch position. See sketch II.

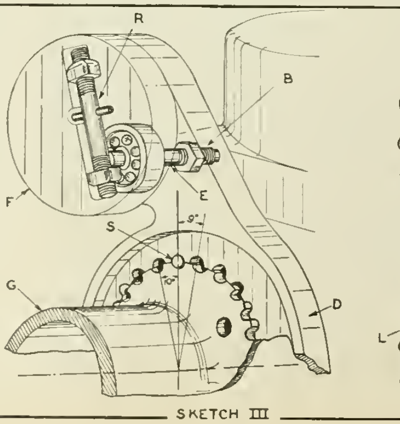
When the oil control valve is turned into the drain position, the oil from the inside of the cylinder is free to flow back into the crankshaft and, through the collector rings, back into the crankcase. The centrifugal force of the counterweight bracket, acting against the ball bearing by means of the cam slot, forces the piston to move inward, thus forcing the oil back into the case. At the same time, the counterweight bracket moves outward and causes the propeller blade to go into the high pitch position.

The ball bearing can move only to the end of the cam slot, so that this would furnish a limit stop for the pitch adjustment for both the high pitch and low pitch position. However, it is desirable to have an accurately adjustable stop which can be set independently for the low pitch position and for the high pitch position. For this purpose, a threaded screw with a nut on each end is inserted in the slot in the counterweight. This limit stop adjusting screw is held from turning by a pin. An extension on the end of the bearing shaft E, which attaches the inner race of the ball bearing to the piston, contacts the nut at each end of the stroke, limiting the motion of the pitch change. This limit stop adjustment may be made by removing the counterweight cap F and turning the nuts on the adjusting screw to the desired position. See sketch III.

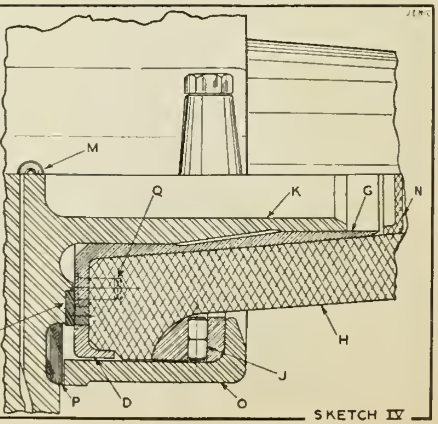
The limit stop assembly R is then placed in the slot in the counterweight and the counterweight cap screwed back and safetied in place. The cylinder guide or piston on which the cylinder slides also acts as a retaining nut to hold the propeller on the crankshaft. Leakage between the cylinder guide and the cylinder and between the cylinder guide and the crankshaft is prevented by the use of



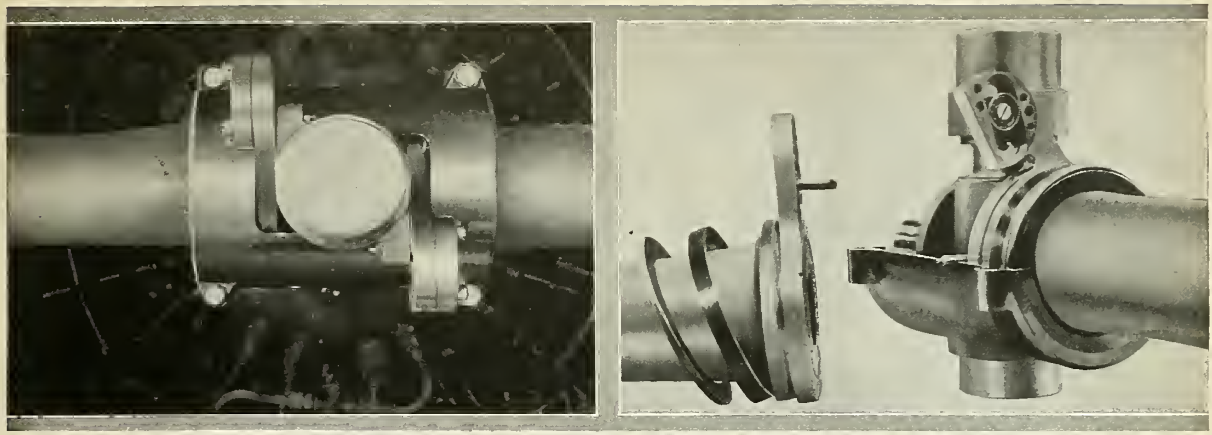
SKETCH II



SKETCH III



SKETCH IV



Front view of the Hamilton Standard controllable-pitch propeller hub and its partial assembly

leather washers. Normally the cylinder moves out and back only once during a flight, so wear on the washers is negligible.

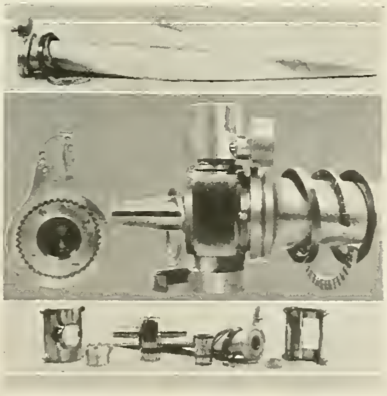
The blade ends are made hollow and are provided with bushings G which are pressed tightly into the ends of the blades H. These bushings should be considered part of the blade assembly. The roller thrust bearing assembly J also is part of the blade assembly and cannot be removed from the blade. These roller thrust bearings are designed for a high capacity and take up the centrifugal force of the blade, permitting them to rotate about their axes with minimum friction.

The thrust and torque forces are taken up on the blade mainly by the fit of the blade bushing on the arm of the spider K. Part of the driving force, however, is taken up by the spider shim plate L which serves to back up the outer portions of the blade ends. This is indicated on sketch IV. These spider shim plates are made up with slightly varying thicknesses and selected at assembly to insure a reasonably tight overall fit of all the parts held between the hub barrel and the spider. For the purpose of lubrication, an alemite fitting M is provided and supplies oil to the interior of the spider arm and the blade end. The blade end is provided with a plug N to prevent the oil from escaping out into the blade. The same oil as used for the lubrication system in the engine may be used for lubricating these parts, and they should preferably be lubricated by alemiting after each ten hours of flying. The centrifugal force on the blades is taken up by the hub barrel O. This is made in halves and bolted together. A micarta bushing P is provided between the hub barrel and the spider to serve as a chafing strip. This bushing may be replaced as the wear on it becomes excessive.

The blade bushings, in addition to being pressed into the blades, are provided with four pins Q to insure a solid attachment for pitch adjustment. The counterweight bracket D fits around the outside of the blade bushing and is held from end motion by the spider shim plate and the blade end. The inside of the counterweight bracket is provided with 40 semi-circular holes, and the outside of the blade bushing is provided with 36 semi-circular holes. This is indicated on sketch III. This makes it possible to use four index pins S spaced 90° apart and also permits indexing of the counterweight bracket relative to the blade in steps of one degree. This feature, together with the adjustment of the limit stop nuts in the counterweights, permits the selection of any desired high- and low-pitch blade angles not more than six degrees apart. Special counterweight parts can be furnished in the few cases requiring more than six-degree range.

It has been the aim of the manufacturer in building these propellers to provide a simple, compact and rugged propeller which will have a higher factor of safety than the corresponding fixed-pitch propeller it is designed to replace.

The blade ends are of the semi-hollow type, combining the advantages of the thin and accurately formed solid blades at the tip, which lead to very high aerodynamic efficiency, and the excellent mechanical properties of drop forgings with the increased strength of a heavy wall hollow end. The semi-hollow construction makes it possible almost to double the bending strength of the inner portion of the blade without excessive increase in weight. The method of attachment of the roller bearing races makes possible the use of extremely large fillets with the resulting increase in resistance to fatigue. It is estimated that this type of attachment is at least three or four times as strong as the usual type of retaining shoulder with moderate-sized fillets. The type of roller thrust bearing used has the highest load capacity per square inch of roller surface of any known type. The location of the roller bearing around the outside of the blade in conjunction with the centering action of the spider on the inside of the blade permits a large roller area without excessive weight in the propeller. These bearings have proved free from any tendency toward indentations or Brinelling.



Hamilton Standard controllable-pitch propeller sub-assemblies

The taper bore of the blade end with its tapered bushing, together with the form of the outside of the blade, provides almost complete freedom from any tendency toward localization of stress which might cause the blades to break off at the shank. The external portion of the hub is shorter than that of any present type of metal propeller and permits the use of a small spinner to cover up the whole hub structure if desired. Where spinner attachment is desired, special spinner attachment bolts are provided in place of the standard bolts.

The action of the controls is such that extra force is available for going into low pitch when the revolutions are below the normal value, and extra control forces are available for going into high-pitch revolutions above the normal value. This is considered a good feature of design, particularly tending to discourage the use of the low pitch position in a power dive, which might result in undesirable overspeeding of the engine.

Digest of Technical Articles from Foreign Publications

By Elsa Gardner

ALUMINUM ALLOYS

Special Light Alloys for Aircraft, W. C. Devereux. Aircraft Engineering, Vol. 5, No. 47, January, 1933, pp. 6-12, 30 figs.

IN ADDITION to describing the manufacture and uses of the Hiduminium R. R. series of aluminum alloys used in the construction of aircraft and engines, the author shows what endeavor is being made to attain soundness and reliability in these products. He touches briefly on the physical properties of this alloy and points out the ease with which it can be cast, the beauty of the finish and the fact that if fed correctly, the unsightly drawing between thin and thick sections is absent. He discusses the requirements of a light piston alloy and how the properties of the present alloys fulfill them.

After dealing with parts of water-cooled engines made of R. R. alloys, he takes up the air-cooled engine and emphasizes the higher operating temperatures of this type of engine which require that the metals be selected with particular regard for their strength at high temperatures. He remarks that for aircraft use extruded sections are in great demand and there is no reason why they should not be used, but the degree of inspection should be other than it is now to prevent parts from getting into service which have been maltreated in manufacture.

TWO-CYCLE ENGINES

The Two-Cycle Aircraft Engine, C. F. Caunter. Automobile Engineer, Vol. 23, No. 302, pp. 15-17, 6 figs.

AFTER BRIEFLY REVIEWING types of two-cycle engines of the pre-war period, the author takes up the technical aspects of the present designs. He concludes that the inherent disadvantages of the two-cycle engine may be largely avoided by careful design and its real qualities utilized. He deals with questions of cooling, solid injection and Diesel engines and finishes with references to the Hurricane, Caunter, Tiger, Wichita Blue Streak, Irwin, Murray Ajax engines, the British Diesel Sidarblen for light aircraft and the Junkers Diesel.

AIRPLANE WHEELS

Some Wind Tunnel Tests on Wheels, Fairings, and Mudguards, F. B. Bradfield and G. F. Midwood. (British) Aeronautical Research Committee—Reports and Memoranda No. 1479, March, 1932 (Issued January 3, 1933), 14 pp., 14 figs.

RESULTS of tests are given which were made on a new type of mudguard in which the mudguard is also a fairing designed to reduce the drag, and so compensate for the unavoidable added weight. Local fairings about the strut joint of the undercarriage were tested and methods of improving the wheel shape considered. It was found that three to four pounds may be saved by fairing the axle-strut joint and 7¼ pounds by enclosing the wheel in a spat. The addition of a tail fairing did not improve the drag while a mudguard fitted over the wheel increased the drag by 3¾ pounds. The fabric-covered wire wheel and the disk wheel of comparable size have the same drag.

VELOCITY GRADIENT EFFECTS

Wind Tunnel Test of Lift and Drag Measured in a Velocity Gradient, F. B. Bradfield and J. Cohen. (British) Aeronautical Research Committee — Reports and Memoranda No. 1489, June, 1932 (Issued January 8, 1933), 44 pp., 4 figs.

EFFECTS of the wind gradient near the ground on the lift coefficient of an airplane were studied in wind tunnel tests for this report. In order to introduce a velocity gradient in a seven-foot wind tunnel, the floor was roughened excessively as far ahead of the test piece as possible so that the velocity gradient was produced by an exaggerated boundary layer. The roughening was produced by fixing fences of wire gauze across the tunnel floor, starting immediately after the honeycomb. Lift and drag were measured on two airfoils and on a circular cylinder. It was found that for a positive wind gradient the lift coefficient was less than in a steady wind. The effect would be very small for any gradient likely to be experienced above an airport. The circular cylinder experienced a downward force in a positive wind gradient.

VALVE STEELS

Metallurgical Problems Arising from Internal Combustion Engine Valves, J. R. Handforth. Engineer, Vol. 135, Nos. 3496-3497, January 13 and 20, 1933, pp. 55-58 and 83-85, 21 figs., 6 tables.

EFFECTS of long periods of heat treatment, such as required of airplane engines in 1000-hour service, on seven well-known valve steels are discussed. After considering valve-steel requirements and how far they are met with at present, the author describes the results of Izod and tensile tests after 1000 hours of heat treatment at the running temperatures of airplane engines. He takes up the causes of cracks in valve seats and points out the necessity for the finest possible macrostructures for valve heads to avoid columnar structures which might separate and split in service. He refers to failure through intercrystalline brittleness at working temperatures and concludes with details of various methods employed for protecting valves with a thin layer of Stellite.—*Paper presented before British Iron and Steel Institute and Institute of Metals.*

HULL AND FLOAT CONSTRUCTION

Practical Metal Hull Construction. Float Construction and Repair. Aircraft Engineering, Vol. 4, Nos. 41, 42, 43, 44, July, August, October, November, 1932, pp. 165-168, 197-199, 17 figs.; pp. 247-249, 282-283, 288, 9 figs.

THE RESULTS of many years of experience in the erection of flying boats are given in these two articles dealing with seaplane hull and float construction. In the first, the author outlines each process, beginning with setting up the hull. He stresses the important points in normalizing duralumin and the time to be allowed for working it, and describes the anti-corrosion treatment for rivets in addition to rivet spacing and sizes.

The process of building seaplane floats is the subject of the second article, as well as methods of replacing damaged parts. The author emphasizes the necessity for the proper provision of drain holes and care in spraying with lanoline to prevent corrosion. For the repair of metal floats, he gives six rules to be followed and describes the process for repairing a punctured float and a damaged frame.

DISTRIBUTION OF STRESS

Stresses in a Plate with a Flanged Circular Hole, K. Sezawa. Tokio Imperial University—Aeronautical Research Institute, Report No. 84, Vol. 7, No. 3, September, 1932, pp. 65-114, 36 figs.

A MATHEMATICAL SOLUTION is given for the problem of stress distribution due to uniform load applied to a plate having a circular hole in which was fixed a ring of the same thickness as the plate itself, but of different elastic constants. The adhesion between the annular collar and the plate was assumed to be perfect. The purpose of the calculation is the solution of the problem of a flanged circular hole. Experiments with gelatine models to verify the validity of the mathematical result for the actual flanged hole are discussed. Good agreement between theory and experiment was shown, provided the height of the flange was not great compared with the thickness of the plate, even when the diameter of the hole was not large.

AIRSHIP MOTIONS

Calculation of the Motion of an Airship under Certain Conditions, D. H. Williams and A. R. Collar. Royal Aeronautical Society Journal, Vol. 37, No. 265, January, 1933, pp. 35-75, 31 figs., 5 tables.

ALTHOUGH the calculations developed were initiated to assist the Court of Inquiry into the disaster to the airship R-101 in finding possible causes of the accident, the results described are of considerable interest quite apart from their first application, in that they demonstrate the behavior of airships under various assumed conditions. Data of the R-101 have been utilized, but curves obtained and flight paths are applicable to airships in general. The conclusion is reached that nose heaviness would certainly bring the ship down, but that,

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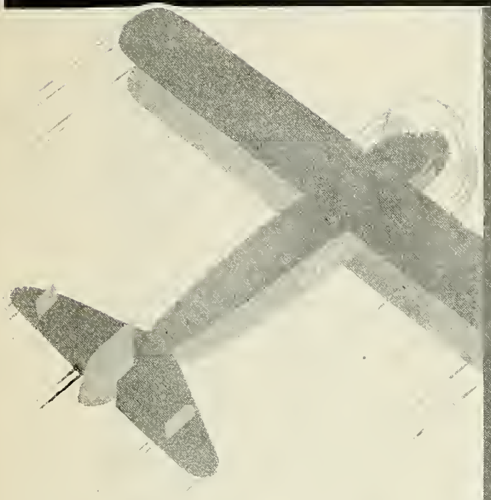
A STEP FORWARD IN AIRCRAFT CONSTRUCTION



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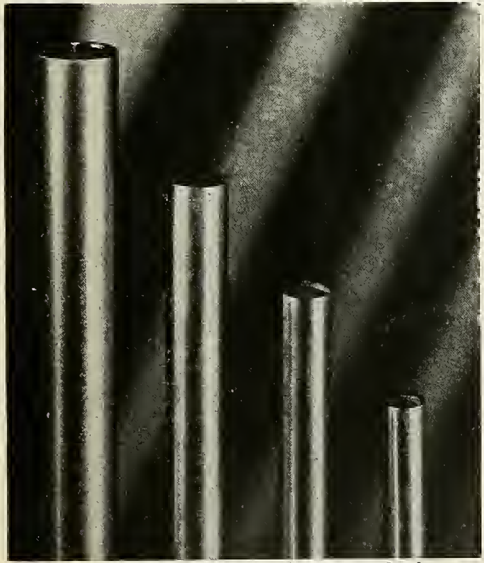

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(*Continued from preceding page*)

after recovery from an initial dive, the ship would descend with her nose well above the horizontal. It was further discovered that the greater the gross heaviness of the ship with given forward heaviness, the greater would be the inclination of the axis during steady descent, or, the smaller the gross heaviness, the more rapidly would the ship dive.

R. 38 Memorial Prize Paper, 1932.

LATERAL CONTROL

The Aerodynamic Characteristics of a Semi-Rigid Wing Relevant to the Problem of Loss of Lateral Control Due to Wing Twisting, A. G. Pugsley. (British) Aeronautical Research Committee—Reports and Memoranda No. 1490, June, 1932, 11 pp., 4 figs.

NET EFFECTS of the aerodynamic terms involved in the critical reversal speed at which the ailerons of a monoplane become ineffective, due to their elastic deformation, had been assumed as adequately represented by the two-dimensional strip theory; and for this report, it appeared desirable to analyze the aerodynamic aspects of the problem for a semi-rigid wing in terms of the Prandtl circulation theory. It was found that the relation between strip theory and circulation theory results could be simply expressed in terms of aspect ratio and of certain rolling moment "induction coefficients" which could be determined theoretically.

ELECTRON-RAY COMPASS

An Inertia-Free Airplane Compass (Uber einen trägheitlosen Flugzeugkompass). W. Ende and M. H. Gloeckner. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 23, No. 20, October 28, 1932, pp. 603-609, 12 figs.

INVESTIGATIONS are reported which indicate fully that the electronic-ray compass can be applied to avigation. The authors consider its advantages of an inertia-free indicator and simultaneous course and banking readings as well as its limitations of size and weight ratio and construction difficulties. The compass consists of an electron tube in which electrons are projected vertically on a fluorescent screen and diverted to the east under the influence of the earth's magnetic field. As a high voltage is required for the instrument, its use is limited to large airplanes carrying radio and lighting equipment.

Report of the Deutschen Versuchsanstalt fuer Luftfahrt.

RUSSIAN WIND TUNNELS

N. E. Joukowsky Aerodynamic Laboratory at Moscow (Il laboratorio aerodinamico N. E. Joukowsky di Mosca). L'Aerotecnica, Vol. 12, No. 11, October, 1932, pp. 1361-1376, 11 figs.

THIS ARTICLE is an Italian translation of a description of twelve Russian wind tunnels which appeared in Report No. 33 of the Central Aerodynamic Institute of Moscow. The author traces the progress of wind tunnels in Russia from 1911 up to the present and compares the characteristics of the various wind tunnels of the Institute. He describes in detail the layout and equipment of the Joukowsky hydro-aerodynamic laboratory at the Polytechnic Institute at Moscow and illustrates the present and proposed wind tunnels there.

PARACHUTE TESTS

Determination of the Opening and Descending Characteristics of Parachutes (Détermination des caractéristiques d'ouverture et de descente des parachutes), P. Leglise and H. Von Stryk. L'Aéronautique, Vol. 15, No. 164, January, 1932, pp., 1-5, 21 figs.

THIS is a composite article, the first by P. Leglise, dealing with studies made by R. Alkan and Co. The second, by H. Von Stryk, covers German tests made by means of a time-recording camera. In the first, the author describes in detail two very interesting instruments developed by R. Alkan and Co. for the experimental study of parachutes; namely, a dummy with automatic control and a dynamometer to register the forces produced at the opening of the parachute. The recording camera discussed in the second part is used for measuring the descending speed of parachutes, but has shown also that it may be used to determine the speed at different altitudes.

PHOTOELECTRIC TACHOMETER

A Tachometer with a Photoelectric Cell (Un tachimetro a celle fotoelettrica), O. Vocca. Rivista Aeronautica, Vol. 8, No. 11, November, 1932, pp. 369-328, 8 figs.

PRINCIPLES on which the designs of tachometers in present use are based are explained and a special tachometer with a photoelectric cell designed by the author is described. The author goes into the development of the device mathematically and takes up the details of its operation. The device is said to have the following advantages: Insensibility reduced to a minimum, possibility of reading the instrument at a distance from the machine when it is in motion, no material contact with the machine while it is in motion, and adaptability to continuous reading of the speed included within limited time.

DOUBLE-ACTING OIL ENGINE

A Double-Acting Two-Cycle Heavy-Oil Engine (Motore ad olio pesante a due tempi e doppio effetto), M. Behmann. Rivista Aeronautica, Vol. 8, No. 10, October, 1932, pp. 72-78, 9 figs.

ASSEMBLY and detail drawings with dimensions are included in this article, in which the author describes his invention of a small two-cycle double-acting heavy-oil engine with a very small bore. This engine is proposed for a motorcycle, but follows along the lines of previous aircraft engines developed by the author, descriptions of which were abstracted and illustrated in AERO DIGEST. To obtain the double-acting effect, a second cylinder is contained within the piston and a second piston operates inside the first. In the present design, 15 h. p. is developed at 3,000 r.p.m., the internal and external cylinder bores being, respectively, 40 and 46 mm., and the stroke 48 mm.

SAFETY FACTOR IN A TURN

The Factor of Safety in a Turn (Il coefficiente di sicurezza nella virata corretta), C. Cesare. L'Aerotecnica, Vol. 12, No. 10, October, 1932, pp. 1322-1329, 7 figs.

CONSIDERING that during a correct turn as defined by General Crocco, the ratio of the total air force on the airplane to its lift is a function of the angle of roll, the author offers a logarithmic nomograph founded on two basic equations of flight in horizontal roll and quite equal to those of the Eiffel-Crocco type. Graduated scales in the ratio of the load while turning to the load in horizontal flight and in the angle of roll permit the solution of all problems relating to turns, and by means of this nomograph it is possible to find all the characteristic attitudes which determine the maximum and minimum conditions and to predict the performance of a given airplane in roll.

PRESSURE ON CORRUGATED SHEET

Note on the Velocity Distribution in the Neighborhood of a Corrugated Sheet, R. Houghton. (British) Aeronautical Research Committee—Reports and Memoranda No. 1466, April, 1932, 5 pp., 4 figs.

EXPERIMENTS on the distribution of normal air pressure over the surface of a train of waves are described. One wall of a three-foot wind tunnel was covered completely with simple harmonic corrugations, and it was thought that an investigation of the flow in the neighborhood of the corrugation would be of interest as an example of a completely turbulent boundary layer. The 7.6_2-cm. corrugations were investigated at wind speeds of 1,400 cm. per second and 465 cm. per second, while the 2.6-cm. corrugations were investigated at 1,400 cm. per second. Within the boundary layer the relation between total head and distance from the corrugations was found to be approximately linear.

WIND EFFECTS IN FLYING

The Effect of Wind in Distance Flights (Le vent dans les records de distance), P. Leglise. L'Aéronautique, Vol. 14, Nos. 160 and 162, September and November, 1932, pp. 277-279, 351-354. 10 figs., 3 tables.

THE EFFECTS of the wind on the flying time over a straight closed course are studied. The author develops a formula for this effect from curves and discusses the problem completely. He explains a graphic process for determining, in functions of the wind, the engine r.p.m. corresponding to minimum fuel consumption per kilometer of the course. He applies the process to the case of the "Trait d'Union" as an example of a long-range airplane, taking into account the wind at any instant of flight and with any decrease in load. In the case of the record-breaking Bleriot 110, he estimates the maximum improvement of performance which should result from a rational use of the meteorological situation, such as flight at different altitudes and modification of the r.p.m.

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. AERONAUTICAL INDUSTRY .

Aircraft Manufacturers Elect Officers

FRANK H. RUSSELL of the Curtiss Aeroplane & Motor Co., Inc., has been elected president of the Manufacturers Aircraft Association, Inc. Other officers include: Vice presidents, Glenn L. Martin of The Glenn L. Martin Co., Eugene E. Wilson of Chance Vought Corp. and E. T. Asplundh of Pitcairn Autogiro Co.; secretary, Walter C. Davis of Davis Aircraft Corp.; treasurer, Clayton J. Brukner of Waco Aircraft Co., and general manager, S. S. Bradley.

All of the above except Mr. Bradley were elected directors of the organization at the sixteenth annual meeting, as were the following: Donald Douglas, Douglas Aircraft Co., Inc.; R. H. Fleet, Consolidated Aircraft Corp.; F. S. Hubbard, B/J Aircraft Corp.; D. A. Luscombe, Monocoupe Corp.; W. A. Mara, Stinson Aircraft Corp., and J. M. Schoonmaker, Jr., General Aviation Corp.

International Air Races at Chicago

PROMINENT PILOTS of the United States and Europe are expected to participate in a four-day charity air meet to be held on the afternoons of July 1-4 in Chicago under the auspices of the Chicago Air Race Corp. As a feature of the races it is hoped to hold the 1933 international balloon race for the Gordon Bennett Cup.

Another attraction being considered is a speed exhibition by racing seaplanes, in Lake Michigan, with the possibility of participation by the British Supermarine S6 B, which still holds the world's air speed championship. The annual Chicago military show is planned for the same dates as those of the air races, and the arrival of a group of airplanes from Italy is expected to precede them by only a few days.

Medical Examination Fees Reduced

REDUCTIONS in the fees to be paid to medical examiners by licensed airplane pilots and applicants for student permits were announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

Applicants for transport, limited commercial and industrial pilot licenses hereafter will pay only ten dollars to the medical examiners conducting their original physical examinations, instead of fifteen dollars as heretofore. Private and student pilots will receive their original medical examinations for $7.50, a reduction of $2.50. A similar reduction applies to annual reexaminations, the fee for which has been reduced from ten dollars to $7.50. Mid-year checks for transport and limited commercial pilots will continue to cost five dollars.

Medical examiners are designated by the Aeronautics Branch to conduct the physical examinations required by the Air Commerce Regulations. Physical standards for pilots are high, and the examinations consequently are very thorough. Amounts of the fees are established by the Aeronautics Branch, but the money is paid to the physicians for their services, none of it being received by the Federal Government.

MacCracken Heads Contest Committee

COL. WILLIAM P. MACCRACKEN, JR., has been appointed chairman of the contest committee of the National Aeronautic Association. Colonel MacCracken, who succeeds Orville Wright in the position, will be in charge of air sports in the United States, including record trials, air meets and contests. He was the first Assistant Secretary of Commerce for Aeronautics and since 1925 has been working in behalf of the aeronautical industry as secretary of the American Bar Association. Col. Clarence M. Young, who succeeded Colonel MacCracken as Assistant Secretary of Commerce for Aeronautics, also is his successor as head of the N. A. A. membership committee.

Early Birds Nominate Officers

CALEB S. BRAGG, for many years a well known sportsman, aviator, automobile race driver and twice winner of the Gold Cup motor boat classic, has been nominated as president of the Early Birds, national pioneer aviation organization. Others officers named include: William E. Scripps, first vice president; Charles H. Day, second vice president; E. M. Laird, third vice president; Augustus Post, treasurer; Ernest L. Jones, secretary, and Capt. Horace B. Wild, trustee. Among trustees renominated are: Anthony H. G. Fokker, Richard H. Depew, L. A. Vilas and Frank H. Burnside.

The election of these officers will take place at a meeting March 13 at the organization's new eastern headquarters, the Savoy-Plaza, New York, N. Y.

Stanley Tool Representative Appointed

HERB COATS is now Pacific Coast representative for the Stanley Electric Tool Co., with headquarters at 576 Monadnock Building, San Francisco, Calif. He was formerly associated with Black & Decker and Van Dorn companies.

COMING AERONAUTICAL EVENTS

March 3. Flying circus by Army, Navy and Marine fliers above Potomac Park, Washington, D. C.

March 4. Inauguration of President Franklin D. Roosevelt, with Army, Navy and Marine planes and dirigibles participating in the attendant exercises, at Washington, D. C.

March 6-10. Annual spring group committee meetings of the American Society for Testing Materials at the Hotel New Yorker, New York, N. Y.

March 8. New York regional meeting of the American Society for Testing Materials, featuring a symposium on motor lubricants, at the Hotel New Yorker, New York, N. Y.

March 11. Christening of the airship *Macon* at Akron, Ohio.

March 13. Election of Early Birds officers at the Savoy-Plaza, New York, N. Y.

March 18. Dedication of national headquarters of the Betsy Ross Corps at Kansas City, Mo.

May 7. Air meet at College Park, Md., under the auspices of the Washington Air Derby Association Inc.

May 16-22. International aeronautic rally at Vienna, Austria.

May 25. Aeronautical tourist meet at Wiesbaden, Germany.

May 28. First annual race for the Deutsche de la Meurthe Cup, in France, under the auspices of the Aero Club of France.

June 1-November 1. Century of Progress Exposition at Chicago, Ill.

June 11. International aeronautic meet at Brussels, Belgium.

June 11. International airplane contest at Angers, France, under the auspices of the Aero Club of the West and the Aero Club of France.

June 26-30. Annual meeting of the American Society for Testing Materials at The Stevens, Chicago, Ill.

July 1-4. International charity air meet at Chicago, Ill., possibly including the balloon race for the Gordon Bennett Cup.

July 4. Dedication of American Legion Dale Jackson Airport at Faribault, Minn.

July 15. International aeronautic rally at Dieppe, France.

September. International gliding congress and meeting at La Banne d'Ordanche, near Clermont-Ferrand, France.

September 9-10. Dedication anniversary program, including air races and aerial demonstrations, at Indianapolis (Ind.) Municipal Airport.

More Waco Planes Ordered by Brazil

THE WACO AIRCRAFT CO., Troy, Ohio, has received an additional order for ten advanced trainers, powered with Wright 240-E Whirlwind engines, for the Brazilian Air Service. These airplanes, which were scheduled to be shipped the latter part of February, will make a total of twenty for the Brazilian Government during the year 1933, ten having been shipped January 7. They will make a total of sixty-nine airplanes for the government within a year's time, the first five Waco's having been shipped March 19, 1932.

Black & Decker Sales Manager Named

ANNOUNCEMENT has been made by S. Duncan Black, president of the Black & Decker Mfg. Co., Towson, Md., of the appointment of Robert D. Black to the position of sales manager.

DIGEST OF RECENT EVENTS

Lighting Conference Held

TWENTY Army, Navy and Department of Commerce flight surgeons and aircraft pilots met at Nela Park, Cleveland, Ohio, for a three-day meeting to study artificial lighting in its relation to flying. (Jan. 24-26.)

Glider Flies Mail Seventy-eight Miles

MORE THAN 200 pounds of mail was carried from Vienna, Austria, to Semmering, seventy-eight miles away, by the glider *Austria II*, piloted by Robert Kronfeld. The motorless flight was made in 1 hour and 40 minutes. (Jan. 27.)

British Fliers Break Non-Stop Record

THE WORLD'S RECORD for non-stop flight was broken by two British aviators, Squadron Leader O. R. Gayford and Flight Lieut. G. E. Nicholetts, who landed at Walvis Bay, South West Africa, 5,341 miles from their starting point, Cranwell, Lincolnshire, England. The flight, which was made in 57 hours and 25 minutes, extended about 328 miles beyond the distance record held by the American fliers, John Polando and Russell Boardman. The British record-breaking plane is a special long-range Fairey monoplane, powered with a Napier Lion water-cooled engine. (Feb. 8.)

Planes "Bomb" Panama Canal

FOURTEEN NAVAL PLANES "destroyed" the Gatun Dam locks of the Panama Canal during Army and Navy maneuvers, in spite of a defending Army air force, calling attention to the need for air protection in the Panama Canal Zone. (Feb. 8.)

Mollison Crosses the South Atlantic

CAPT. JAMES A. MOLLISON, British flier who last year flew across the North Atlantic, landed at Natal, Brazil, completing a solo crossing of the South Atlantic from Thies, Senegal, French West Africa, with an average speed of almost 115 miles per hour. The flight was made in the Puss Moth monoplane, *Heart's Content,* in which he made his North Atlantic crossing, with a 130-horsepower Gipsy Major engine substituted for the former 120-horsepower Gipsy III. (Feb. 9.)

Ten Rescued by Airplane

EIGHT MEN AND TWO WOMEN who were marooned in Middle Ground Lighthouse, Long Island Sound, were located by a *New York American* plane. The party had been missing for two days after the fishing schooner in which they were traveling had become disabled. (Feb. 10.)

Plane Subdues Mutinous Ship Crew

AFTER a five-day chase, the Dutch cruiser *De Zeven Provincien,* which had been guided about the Indian Ocean by a mutinous crew, surrendered to the Dutch East Indies fleet following the dropping of a bomb on the vessel by a Dutch flying boat. (Feb. 10.)

Freight Plane Makes Record

A TRANSCONTINENTAL COMMERCIAL SPEED RECORD was set by a Lockheed Orion plane of the Air Express Corp., when it landed at Floyd Bennett Field, Brooklyn, N. Y., 13 hours and 50 minutes after leaving Los Angeles, Calif. (Feb. 12.)

Mail-Carrying Glider Towed over Alps

IT WAS REPORTED that a glider transporting 110 pounds of mail was towed across the Alps from Zurich, Switzerland, to Milan, Italy, by a Puss Moth airplane. The tow rope was cast off above Milan, and the glider, piloted by Willy Farner, descended to a landing. (Feb. 13.)

Mollison Reaches Buenos Aires

CAPT. JAMES A. MOLLISON landed at Buenos Aires, finishing a flight that started in England seven flying days previously. (Feb. 16.)

Airport Conference Held

AERONAUTICAL REPRESENTATIVES from Ohio, Indiana, Michigan, Pennsylvania, Kentucky and West Virginia were among those who attended a conference on airport management and finance at Columbus, Ohio. (Feb. 20 and 21.)

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ALL BRANCHES of aeronautical activity are so closely related that none is independent of the others. Every man who holds an important position in the aviation industry is familiar with what goes on, not only in his own organization, but in others as well. He sees the industry as a coordinated unit, not as independent and disjointed branches.

It has been the aim of the editors to make AERO DIGEST the sort of magazine which serves its readers in that manner. As a result, more than 53,000 people read AERO DIGEST every month. They know it covers every phase of civil and military aeronautics, and that it is interesting and helpful to students, mechanics, pilots, operators, manufacturers, engineers, aeronautical investors, etc., etc.

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Washington Air Meet Planned

AN AIR MEET to be held at College Park Airport, College Park, Md., will be conducted May 7 under the auspices of the Washington Air Derby Association Inc. No entrance fees will be required, nor will there be any cash prizes. Trophies for all events are to be donated by Washington and Maryland business organizations and individuals. Revenue derived from parking will be given to charity.

Proposed events include sportsmen pilots' races, a free-for-all, a slow race (twenty miles to landing direct), a pentathlon (race twenty miles to landing, spot landing and barrier landing), an OX-5 race, a dead-stick landing contest, a parachute-jumping contest, a national guard and reserve unit trophy race, a women's race and a bomb-dropping contest.

Autogiro Firm Remains Separate Unit

THE WORDING of a statement in last month's AERO DIGEST regarding Pitcairn Aircraft, Inc.'s change of name to the Pitcairn Autogiro Co., unintentionally implied that that concern had been combined with Autogiro Co. of America. This is not the case, and the Autogiro Co. of America continues to function as an engineering and licensing organization for the autogiro in the western hemisphere. The Pitcairn Autogiro Co. continues as one of the American licensee autogiro constructors under patents held by the Autogiro Co. of America.

New Granville Company Organized

ALFRED D. CHANDLER has announced his resignation as treasurer of the Bellanca Aircraft Corp. Together with William B. Hurlburt, formerly executive vice president of the Bellanca concern, he is combining his interests with the Granville brothers of Springfield, Mass., in a new manufacturing company. Z. D. Granville, who heads the new corporation, is designer and builder of the Gee Bee speed ship which now holds the world's landplane speed record.

The new company, called Granville Aircraft Corp., will carry on the work of the Granville brothers in the factory at Springfield Airport. Officers announced by the corporation are: Z. D. Granville, president; W. B. Hurlburt, vice president; A. D. Chandler, secretary and treasurer.

It is expected that an entirely new type of passenger plane will soon be announced by the firm. According to James C. Tait, a director of the corporation, the new ship will be large enough to carry several persons and will travel at unusually high rates of speed.

W. L. LePage Starts Independent Work

W. LAURENCE LEPAGE, formerly vice president and chief engineer of the Kellett Autogiro Corp., has resigned his connection with that organization in order to undertake independent work in autogiro development. With the active cooperation of the Autogiro Co. of America, which is making available their autogiro development experience and experimental facilities, Mr. LePage is devoting his whole time to the varied problems involved in the design and construction of large transport autogiros. He is located at 1320 Land Title Building, Philadelphia, Pa.

W. B. Kinner Heads New Concern

W. B. KINNER has resigned as director and consulting engineer of the Kinner Airplane and Motor Corp., Ltd., and has organized a new $5,000,000 company to be known as the Security-National Aircraft Corp. This firm will immediately go into production of a line of planes priced within the reach of the average person.

The new company has taken over the former Emsco Aircraft plant in Downey, Calif. The plant has approximately 75,000 square feet of floor space, and there are 7,000 feet of oiled runways. The building is equipped with machinery necessary to start production immediately.

The first model to be placed on the market will be a two-passenger training and sport job of approximately 100 h.p. This will be followed by three- and five-passenger planes. All models will be equipped with self-starter and electric lights. A course of instruction will be given free to all purchasers who require it.

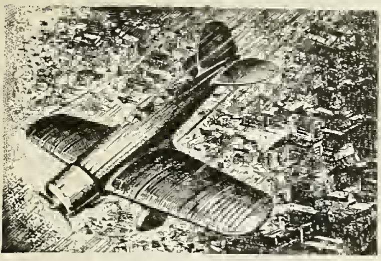
Officers and directors of the company include: W. B. Kinner, president; J. B. Alexander, vice president and sales manager; Winfield B. Kinner, secretary-treasurer, and H. Park Arnold and A. W. Hutchinson, directors.

Firms to Cooperate in Work

FLEETWINGS, INC., Garden City, N. Y., and the Edward G. Budd Manufacturing Co., Philadelphia, Pa., have completed negotiations by which the further development of the "Shotweld" system in aircraft construction will be carried on jointly. The two companies will continue their research under a cooperative plan which would save duplication of effort and thus extend the scope of its application. The rights to use the process covered by applications and patents are cross-licensed one to the other, together with the right to sub-license the system in the aircraft industry.

Eclipse Takes Over Sky Specialties

BUSINESS ASSETS of Sky Specialties Corp., Detroit, Mich., have been purchased by Eclipse Aviation Corp. The engineering, manufacturing and sales activities pertaining to the Heywood injection starter and other products of Sky Specialties will be continued at the East Orange, N. J., factory of Eclipse as part of its general line of starting equipment.



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Air transportation is the youngest of the travel systems and the least expensive to the government. It is for these reasons and on the basis of merit that we recommend continued governmental support for the aviation industry, rather than restriction and curtailment.

The airports, terminals of air travel, have played an important part in the rapid and sound growth of air transportation. It is with pride that the Rhode Island State Airport points to its own part in facilitating the growth of aviation in the New England territory. As a result of that growth the Rhode Island State Airport is one of the busiest and most attractive aeronautical centers in this region.

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• FOREIGN NEWS IN BRIEF •

Mount Everest Planes Pass Trial Tests

CLIMBING to a height of over 35,000 feet, the Houston-Westland biplane purchased for the flight to the summit of Mount Everest recently completed its acceptance trials and has been dispatched by steamship to India. The flight in which the mark of 35,000 feet was surpassed was made while the plane carried its full load of fuel and equipment in addition to two fliers, H. J. Penrose, chief test pilot of the Westland company, and Air Commodore P. F. M. Fellowes, leader of the proposed expedition.

The greatest height was reached in seventy-four minutes from the start, and at that altitude in a few minutes of level flight the airplane maintained a speed of 140 miles per hour. Controls were reported to work perfectly, and the two fliers, provided with electrically heated clothing, did not suffer from the temperature of 76 below zero. The propeller did not enable the full horsepower of the Bristol Pegasus engine to be used until a height of 13,000 feet was reached, so that a large part of the horsepower was available at a higher altitude.

Following successful trials of the Westland Wallace biplane, sister ship to be used on the expedition, which reached an altitude of about 34,000 feet, several leaders of the project took off last month for India. Traveling in three light Moth planes, the group included Air Commodore Fellowes and Mrs. Fellowes, the Marquess of Douglas and Clydesdale, Flight Lieutenant McIntyre, C. H. Hughes, mechanic, and E. C. Shepherd, news correspondent.

AFRICA

CONNECTIONS with the Congo territory have been made available at two points, Juba and Broken Hill, on the Imperial Airways London-Capetown route. This means that only eight days of travel are now required between London and the Belgian Congo. The same period is taken by travelers from Belgium who, proceeding from Brussels, join the Imperial Airways service and fly through to Juba. From this point motor transport takes them to Stanleyville, where connections are effected with the SABENA air services in the Congo.

Passengers who fly north from Capetown can change at Broken Hill to a feeder air service to Elisabethville. Here there is a train link to Port Francqui, at which point connections are established with the Congo airways, which run from Luluabourg to Leopoldville. Plans are well advanced for effecting the Elisabethville-Luluabourg stage by air rather than by rail.

The special chartering of aircraft, for exploring and hunting, is considerably on the increase in Africa. Another development which the use of aircraft is rendering possible is the proposed establishment of new camps, for hunting and wild-life study, in territories served by air stations such as Juba and Kampala. Communications between these camps and the air stations will be maintained regularly by airplane.

Statistics show that there has been an increase of over fifty per cent lately in traffic by the African air mail. Flights completed to schedule, according to recent figures, were ninety-nine per cent on northern sections of the Cairo-Capetown route, and 100 per cent in the South.

CANADA

THE DISTINCTION of operating the largest of the twenty-five flying clubs in Canada goes to Edmonton, Alberta. At the annual meeting, held recently, it was shown that during 1932 a total of twenty-four private pilots' licenses and five commercial licenses were won by members, which was one-twelfth of all the licenses issued in the Dominion to the flying clubs during the year. A total of 800 hours of flying was made during the year by pupils at the Edmonton club.

GOVERNMENT AIRPLANES of Ontario will be used in winter against illegal trapping in the Quetico Reserve. This fur-bearing game sanctuary, which is 3,000 square miles in area, is to be guarded by fire patrol planes mounted on skis.

INAUGURATION of two new air mail services last month was announced by the Post Office Department. These were between London, Ontario, and Buffalo, N. Y., and among Great Falls, Bissett and Wadhope, Manitoba.

INTERNATIONAL TRAFFIC using St. Hubert Airport, Montreal, was greater in 1932 than in 1931 in every classification except incoming mail.

AIRPLANES were called on for the first time in Canada to rush police to a strike area, when ninety provincial police were carried by air from Vancouver to Anyox, British Columbia, where 1,000 men walked out at a mining and smelting plant, and disturbances were feared.

FRANCE

THE AIR BUDGET ESTIMATE for 1933 totals 2,139,170,429 francs, a decrease of about twelve per cent under the appropriation for 1932. Items pertaining to civil aviation include: Airline subsidies, 192,000,000 francs; civil pilot training, 8,500,000 francs; "encouragement of touring and sanitary aviation," 6,500,000 francs; subsidies for the development of aviation in general, 3,171,334 francs, and research and construction of prototypes, 147,556,666 francs.

AMONG AERONAUTICAL DEVELOPMENTS reported for 1932, it was estimated that the length of French subsidized air services operating during the year totaled about 23,720 miles. About 600 airplanes, of which it is estimated one-fourth were civil planes, were manufactured during the year in France. About 200 glider clubs exist in the country, and a national center for gliding is being formed at La Banne d'Ordanche, near Clermont-Ferrand.

THE FIRST of a new fleet, the dirigible E-9 has been officially taken over by the Navy and stationed at Orly airdrome near Paris. Following tests of the ship, more dirigibles are expected to be built to accompany and protect Naval transports.

GERMANY

STEPS to provide for the creation of a commercial and sports air fleet that will be able to provide security for Germany in the air have been taken by the German government, Minister of Aviation Hermann W. Goering is reported to have told a gathering of German war aces last month. He said that the cabinet has already moved toward putting into effect his plan for such an organization.

THE DEUTSCHE LUFT HANSA has ordered eighty-eight airplane engines from the Bavarian Engine Works at Munich. The engines, costing about $684,600, will probably be delivered during the first half of this year. They are BMW VI engines and 525-h. p. engines of American design.

GUSTAV LILIENTHAL, who with his brother Otto is known as the discoverer of the arched wing surface principle of aerodynamics, died of a heart attack recently at the Aldershof airdrome. He helped his brother build one of the first gliders in which flight could be maintained.

(Continued on following page)

A CONTRIBUTION TO THE ADVANCEMENT OF AVIATION

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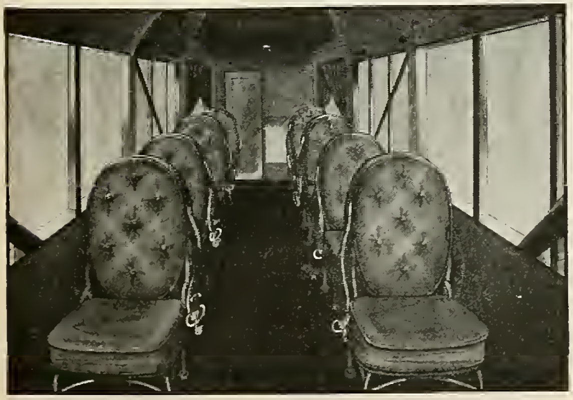

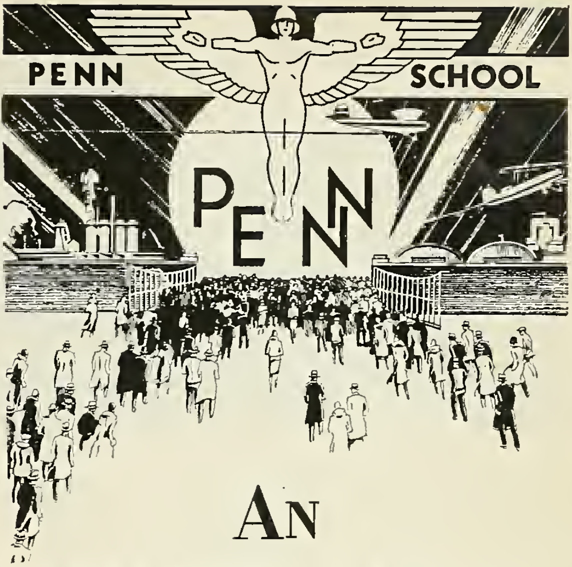

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(Continued from preceding page)

GREAT BRITAIN

AWARD of the Britannia Trophy for 1932 to Cyril Uwins, who last autumn set a new world's height record of 43,976 feet, has been announced. This honor, which is given by the Royal Aero Club, goes annually to the British aviator who is thought to have accomplished the most meritorious performance in the air. Uwins joins a group of fliers which includes Alcock and Brown, first to fly non-stop across the Atlantic Ocean; Alan Cobham, Goble and McIntyre, who were first to circumnavigate Australia by air; Hinkler, Lady Bailey and Kingsford-Smith.

AMY JOHNSON MOLLISON was notified last month that she has been awarded the Segrave Memorial Trophy for 1932. The two previous winners were Bert Hinkler and Sir Charles Kingsford-Smith.

IN CONJUNCTION with the England-India flying mail of Imperial Airways, a "feeder" airline of more than 1,000 miles is operating, which, connecting at Karachi with services to London, establishes aerial links with Bombay and Madras. This auxiliary service is by the Tata Co., and its existence means that air mails from London now reach Bombay in seven days and Madras in eight.

PASSENGER TRAFFIC on the Imperial Airways continental routes during October, November and December, 1932, exceeded by nearly 150 per cent the totals recorded during a similar period of 1931. The figures for the three months of 1932 reached 8,387, as compared with 3,873 for the corresponding months of 1931.

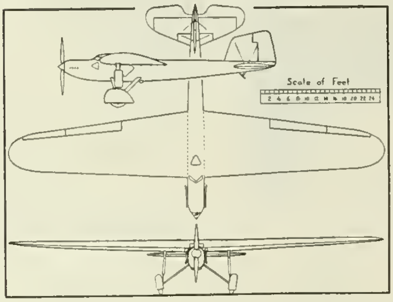
Figures dealing with the growth of British air transport, which have just been compiled, show that whereas eight years ago, when Imperial Airways was established, the fifteen machines constituting the company's fleet flew a total distance of about 850,000 miles, the present annual mileage of the fleet, which now totals forty machines, has reached 2,000,000 miles a year. At the present time the aircraft are flying approximately 6,000 miles a day.

In 1931 the total number of travelers flying to and from the London airport, by all services, was approximately 45,000, which increased to 70,000 by 1932. Of these totals 28,644 of the passengers in 1931 flew in British airliners, and 41,500 in 1932.

THOUGH only fifty-one days of the year were recorded as "O. K." for flying, the Scottish Flying Club established a new record for hours flown during the twelve months which ended on November 30. The club trained twenty-two pilots to qualify for the amateur pilot's license, and as many more were almost as far advanced at the close of the year. In addition, six of the pupils who were taught to fly in 1932 went on to qualify for the commercial pilot's license.

Acme Photo

Napier-powered Fairey long-range monoplane which set a new non-stop distance record last month in a flight from England to South West Africa



Club aircraft flew many more hours and more intensively than in any previous twelve months, total flying time aggregating 1,745 hours against the previous mark of 1,414 hours. All of this flying was done by five light airplanes, each of which spent on the average nearly 350 hours in the air, equivalent in distance flown to more than 30,000 miles.

A SHIP-TO-SHORE air service terminal has been foreseen in the acquisition by Southampton of the Atlantic Park Hotel and grounds. The location will be used as a site for a municipal airport and as quarters for the Hampshire Airplane Club.

ITALY

THE PROPOSED FLIGHT of twenty Savoia-Marchetti seaplanes from Italy to Chicago may be extended into a trip around the world, according to a recent report. Instead of starting in the middle of June, the flight, under the command of Gen. Italo Balbo and Gen. Aldo Pellegrini, may begin May 24. The supply ship, *Alice,* was to sail last month to leave fuel for the flight at points along the trans-Atlantic route.

JAPAN

CONSTRUCTION of a commercial airport at Nagoya has been proposed, to start this year. The airport will be located on reclaimed ground of the Nagoya harbor and will be about 230 acres in area. Cost of construction will be about 1,700,000 yen.

AERIAL FORCES continued to aid Japanese troops in raids upon Jehol, according to reports. Bombing planes caused much damage, resulting in further withdrawal of Chinese forces.

MEXICO

WORK will be pushed in order to complete before the end of spring improvements to the Mexico City central civil airport, according to the aviation section of the Ministry of Communications and Public Works. These improvements consist of six landing fields, six runways, twelve hangars, engine repair shops, post, telegraph and telephone offices, radio, meteorological and first-aid stations, and oil and gasoline supply stations. After the installation of these services the Ministry proposes to provide the port with a hotel for the convenience of air voyagers who take early morning planes. Roads leading to the port have been asphalted, and several illuminating reflectors have been installed.

ACCORDING to the Ministry, modern airports will be ready for service on March 1 at the American border towns of Matamoros, across from Brownsville, Tex., and Ciudad Juarez, over the border from El Paso, Tex.

SOUTH AMERICA

DAMAGE was inflicted on a Colombian gunboat flotilla by a group of Peruvian airplanes, which bombarded the ships on the Putamayo River last month, according to news reports. Anti-aircraft guns on the ships finally drove off the planes, but not before one of the gunboats was badly damaged.

Protected by airplanes, Peruvian troops retook the town of Encanto.

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RESTRICTIONS HINDER PROGRESS

(*Continued from page* 25)

a new system must be built up around such transportation. Much of this will revert back from the automobile and airplane to the railroads.

Aviation can, however, lead the way out of this dilemma if Government rulings will permit it to. One-hundred-mile-per-hour rail cars can be built, weighing one-fifth of present passenger equipment, which will develop safety measures for these high speeds, but which can not be adopted by the railroads under the present rulings. Aviation will develop power plants that are more economical than any that have been used for transportation, making it possible to carry passengers over long distances for less than bus fares and in much greater comfort. They will increase schedules between all centers, and the number of arrivals and departures per day besides increasing passenger travel as a result of lower cost. Therefore, the locomotive builder must devise a new industry or go into an intensive study of transportation from the standpoint of light-weight, high-speed and more or less individual units for all passenger work. Paralleling railroads can divide up the business among freight, passengers, etc.; perhaps one road may be devoted exclusively to high-speed passenger work on non-stop schedules between terminal points.

As a result of the adoption of new engineering and entirely new ideas, terminal methods will change, and the central railway stations may not be a permanent institution. The old barnacles which now hinder the progress of the railroads will automatically drop off and the old rules vanish because they no longer apply. This new equipment, and the new fight which aviation can make with the railroads, buses and trucks for a higher form of development, will benefit all, and restrictions will come only from their own inter-organizations, operating for the common good of all branches of transportation.

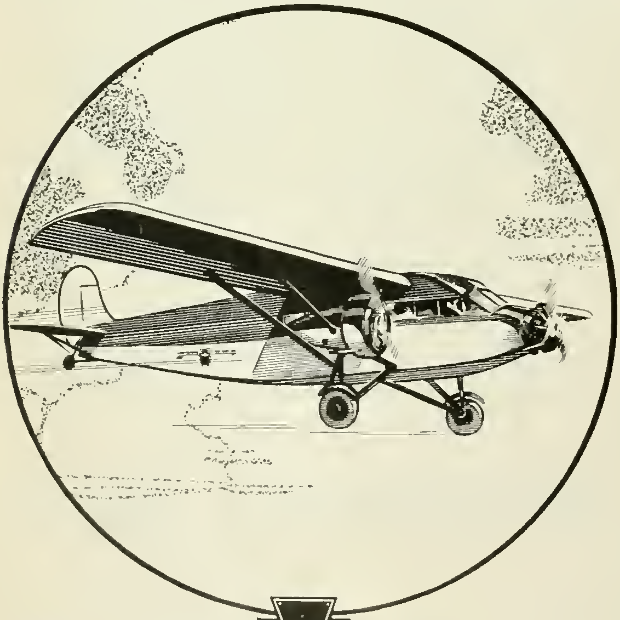
A SYSTEM OF RADIO AIDS

(*Continued from page* 29)

The combined instrument is in the top row immediately to the left of the artificial horizon while the approximate distance indicator is at the extreme left end of the lower row of instruments. The combined instrument is shown in more detail in Fig. 6 and the approximate distance indicator in Fig. 7.

The combined instrument consists of two separate instrument movements mounted in a single case of standard aircraft dimensions and with the pointers of the two movements crossed at right angles. Two reference lines intersecting at right angles are provided on the face of the instrument, the vertical reference line corresponding to the proper directional course and the horizontal reference line to the proper landing curve. The point of intersection of the two pointers indicates the position of the aircraft with respect to the proper spatial landing path. When the two pointers intersect at the central circle as shown at *a* (Fig. 8), the airplane is on both the runway localizer course and the landing curve. When the point of intersection is as shown at *b*, the airplane is to the left of the course and below the landing curve, and when the point of intersection is as shown at *c*, the airplane is to the right of the course and above the landing curve.

(*To be continued in the April issue*)



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FREQUENT DAILY SCHEDULES. COMFORTABLY HEATED RADIO EQUIPPED TRI-MOTOR PLANES.

OLD PILOT'S MESSAGE TO CONGRESS

(*Continued from page* 30)

ginning of the air force that we should have to build if we again entered a major war. Even at the rate of aircraft destruction that prevailed during the closing year of the war of 1914-18, the Royal Air Force was expending on all fronts and on home training over twenty airplanes a day. At that rate our present Army Air Corps would be wiped out in a month. It must be remembered that the airplane is at once the most effective and the most vulnerable of war weapons; it can do more damage, accomplish more destruction, and be itself destroyed easier than any other of our war weapons. For that reason all of our defense plans must include the rapid replacement of aircraft. This replacement is possible only in factories equipped for the production of aircraft. In the last war we had ample and costly evidence of the fallacy of thinking that automobile body plants could be converted at a moment's notice into efficient aircraft factories. Our experiment proved that good airplanes are produced only by airplane factories.

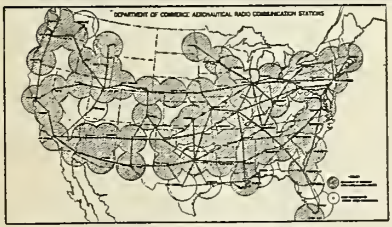
However, to keep airplane factories running in peacetime only to turn out war equipment would be a costly matter. While a few factories now are building only war planes, others are developing and building commercial craft to supply the demand made possible *only* by the fact that the carrying of air mail is a subsidized activity. In time of war these factories, with their trained and long experienced aircraft personnel, could be adapted easily to war craft, and their trained personnel would act as the experienced nucleus of a factory whose facilities would be expanded to fill our war needs. Without the air mail subsidy and the consequent demand for new equipment, these factories would have to go out of business, to be created by inexperienced workers in time of war need, at what cost nobody knows.

By this time you may be wondering why a subsidy is necessary, why aviation of the commercial species cannot stand upon its own feet. The answer is that except in especially favorable geographical circumstances it cannot yet do so, and should not be expected to do so. It is only twenty-nine years since the first man left the surface of the earth in a motor-driven heavier-than-air craft. In that time we have not developed the art or science of aviation to a point where it is commercially self-sustaining. No foreign nation has done so, either.

The pioneer commercial lines only started in 1927; they only began to progress by 1929. The fact that they have made such surprising gains in traffic in the last three years of business prostration is proof that the public will fly and will pay for the service. However, it will be some years yet before enough people will fly to pay all costs of operation. Until that time the Government must support this new development, or be content to see it collapse for lack of support; in which event much of the money that has been spent so far on this important adjunct to our national defense will have been wasted.

It would be a betrayal of trust for the Government to default in its obligations to the men who have invested their capital in airlines. This money was invested and these lines were put into operation on the strength of contracts, many of them to run until April, 1936, by which the airlines were

(*Continued on following page*)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"During the years that I have been concerned with the construction and operation of aircraft, I have witnessed aviation's transition from a "circus" to a well-rounded and progressive industry. Real growth began when the government gave its support. It is regrettable that Congress proposes to withdraw that support at this particular time, when continuation for another few years will result in self-sustainment."

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CONGRESSMEN:

TO appreciate the valuable service which the airlines give to the traveling public, make your next trip by air.

MANY OF YOU already have flown on one or more of the nation's airlines. Consequently, you are better able to pass judgment on whether or not they are deserving of continued government support. Those Senators and Representatives who have yet to take their first trip on the airlines cannot realize the many factors which are responsible for the increasing popularity of air transportation.

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(Continued from preceding page)

guaranteed a certain (or uncertain) income for the flying of mail. These air mail contracts, entered into by the Post Office Department, have behind them the word of the Government. It is not possible to cancel them and still hold faith with the men who invested their money on the strength of these contracts.

Discontinuance of air mail means not only the closing of the airlines. It means the closing of the greater number of the flying schools of the nation; for it is certain that very many of the pupils in those schools, not only pilots but mechanics and aircraft workers, are learning the business because they feel that there is a future for them on the airlines or in the factories. In fact, there is in the mind of every student and every man who has studied aviation and thought about its future, the certainty that year after year will see a tremendous growth in airlines for mail, for passengers and for express. But this expansion will not and cannot come if, in these critical years, should be withdrawn the support which aviation still needs, and will continue to need until the physical facilities and the volume of business have been much further developed.

I have mentioned the rapid destruction of aircraft in time of war, basing my assertion only on the known wastage in the last war. The wastage in personnel is almost equally rapid. Pilots, like airplanes, are expendable material in time of war, as a glance at casualty lists will show. When expended they must be replaced. In the schools of our nation young men are being trained, at their own expense, to become pilots. They constitute a large reserve of flying men who are available, with the necessary extra military or naval training, as war pilots. The importance of a large group of trained pilots, mechanics and aircraft workers cannot be over-emphasized. It is not suggested that airline pilots would be transferred to war work—in time of war the airlines would be more than ever needed to speed up the transportation systems of the nation. But what is suggested is that this constant stream of young men going through our schools, most of them unable to find jobs when they graduate at this time, yet have the basic foundation and training that every war pilot must have; and the mechanics and the aircraftsmen leave those schools fully trained, ready to take their places in time of need. It is fairly obvious that with Government support withdrawn from the airlines, with the consequent curtailing of service or abandonment of the lines, young men will no longer enroll in schools to train for an occupation in which they will be unable to find employment, now or later.

THE FEDERAL AIRWAYS SYSTEM

(Continued from page 21)

for its policies consider that they have a standing obligation to furnish information to the public, if possible, when specific requests are received. Many such requests are directed to the Aeronautics Branch because it enjoys the national reputation of being the clearing house on all matters pertaining to civil aeronautics in the United States. These requests require answers in the form of correspondence, publications, public addresses or special articles.

Airports and airport development are absolutely necessary for the operation of aircraft. The Federal Government has not undertaken to provide any airports, although it does construct intermediate landing fields between airports on lighted airways when such landing facilities are not available from private or municipal sources. However, to assist in maintaining standards, and to enable communities to expend their airport appropriations efficiently, the Aeronautics Branch gives free advice as to selection of sites and information with respect to general equipment and facilities, effective landing area and lighting equipment. But, it does not engage in any airport engineering work.

Mapping of airways is an extension of a Government function that has long been carried on to the benefit of other forms of transportation. Charts of coastal areas are indispensable for shipping, surveys of inland areas have made possible rapid extension of highways and railroads. Now the airman lays out his course on maps compiled, flight-checked and published by the Aeronautics Branch especially for his use and sold to him by the Federal Government.

Outside the Federal Government various lines of study concerned with aeronautic trends are being pursued. Frequently, those engaged in such work can be brought together by the Government for coordination of related projects, or to direct various lines of thought upon a particular problem. Such an accomplishment is represented by the special research committees sponsored by the Aeronautics Branch. Problems involved are indicated by the names of the committees, which have conducted exhaustive studies and made reports for the benefit of the public and the industry. These follow:

Fact-Finding Committee on Control of Airplane Hangar Fires by Automatic Application of Water.

Liaison Committee on Aeronautic Radio Research.

Committee on Airport Zoning and Eminent Domain.

Committee on Airport Traffic Control.

Committee on Airport Drainage and Surfacing.

Committee on Air Marking.

In regulating civil aeronautics under the provisions of the Air Commerce Act, it has been the endeavor of the Aeronautics Branch to assure the safety and reliability of flight, but at the same time to avoid surrounding the new industry with restrictions which would hamper development.

The basic regulatory function is licensing of airmen as to competency and aircraft as to airworthiness. Airmen include pilots, licensed as transport, limited commercial, industrial and private according to ability and experience and type of flying. Also, the term airman applies to airplane and engine mechanics.

Licensing of aircraft involves examinations from the standpoint of airworthiness of individual craft, and also approval of aircraft as types. Also, the various parts and accessories of an aircraft must conform to equally high standards of airworthiness, and accordingly, the Department examines and approves engines, propellers, components and accessories. Further, there are regulations dealing with aircraft repairs, repair stations and parachutes.

Governing operation of aircraft are the Air Traffic Rules, applying to all aircraft in flight. Operators of specialized types of services are concerned with the flying school regulations, regulations governing entry and clearance of aircraft flying across the international boundary, and the regulations governing operation of scheduled interstate air passenger services.

The latter regulations, applying to the air lines, are concerned with adequacy and suitability of equipment and operating methods, and competency of personnel. They provide for a scheduled air transport pilot's rating, issued only to such pilots as are able to qualify in thorough tests

(*Continued on following page*)

Famous Aeroncas... No I

2300 *hours - in two years ...and still going strong!*

It's one thing to make claims . . . and another thing to show actual proof! Aeronca NC 11420 was the first two-seater to leave the factory. That was in March, 1931. Eric D. Leche flew it for 13,000 miles on a demonstration tour through 17 states. On the first of July an extra tank and compass were installed. It was entered in the Ford Reliability Tour. After placing first in the Figure of Merit test, in competition with 20 other ships of all types, George Dickson flew and finished the 5000 mile grind . . . to make the Aeronca the first and only light plane to ever complete this supreme test of stamina and reliability.

In August, 1931, Ed. Ritchey of Fort Worth purchased the ship. For exactly one year, he used it continuously in student instruction. He averaged over 100 hours per month and, due to the low operating and maintenance cost, made more money by far than any other operator in his vicinity. Scores of students received their training and licenses on this ship; hundreds of passengers, their first ride. And, then, Ed. Ritchey bought another Aeronca . . . from the money laid aside for depreciation. The ship had literally paid for itself, besides earning an average of over $5 per hour *net profit.*

Richard Spencer, former navy instructor and nationally known cartoonist, then started the now famous "Dixie Legion." He needed a thoroughly reliable, economical training plane. He bought NC 11420 from Ritchie. The price was $1100. That was six months ago. Since that time the ship has been flown more than ever. Scores of new students have earned their wings with it. Hour after hour, day after day, time was piled up until today . . . that ship has flown over 160,000 miles. An average of over 3 hours per day for two years.

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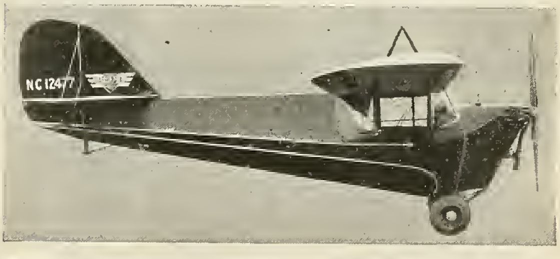

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(*Continued from preceding page*)

of ability to fly entirely by instrument and radio, and theoretical knowledge of air navigation and meteorology. Their sole object is to assure safety and reliability of air transport.

In most of its phases, a regulatory program for aeronautics can be handled in no other way than by centralization in the Federal Government. The normal operations of an aircraft may take it across many state borders in a single day. It is to the best interests of the pilot, the authorities and the public that regulations be uniform. This is true of rules governing air traffic, and of requirements with respect to licenses for the airman and his craft.

Airplanes built in one factory may be sold to purchasers in 48 different states. It is essential that all of these craft be airworthy, and this may best be accomplished by having one set of standards to be met. The same applies to engines, propellers, components, accessories and parachutes.

Local authorities have problems to contend with, and these problems will increase as the amount of flying becomes greater. However, these problems can best be met by coordinated action guided by one agency. States, in framing their legislation dealing with aeronautics, have recognized this fact, and are following the leadership of the Federal Government in licensing and other regulations.

The aeronautics industry has always welcomed constructive regulation by the Federal Government, realizing the value of standards to which all must conform. Individual members of the industry recognize that although they may themselves maintain high standards of design, construction practices and operating methods, existence of a single company conducted upon less efficient lines would tend to discredit all the rest. Consequently, the industry not only has willingly applied the regulations to itself, but has given information and suggestions that have been helpful in shaping the course of regulation.

THE PRESENT AIR MAIL SITUATION

(*Continued from page* 23)

This bill, first of all, returns to the Congress the prerogative of fixing air mail postage rates. Recently this prerogative has rested with the Post Office Department. The rates established in this bill are 5 cents for each half ounce or fraction thereof and the Post Office Department is authorized to furnish a 2 cent air mail post card. These rates insure a national increase in the patronage of the air mail service, with resulting increase of revenue to the Post Office Department. The 5 cent half ounce letter rate will permit of the mailing of an average weight two page business letter. The 2 cent air mail post card will open a new service of air mail business and revenue and will greatly extend the benefit of this fast service to a great many people.

The Postmaster General is authorized to place mail on aircraft operating on a fixed daily schedule at a fixed rate of two mills per pound mile flown by the carrier. This payment is on a basis of the service rendered to the Government.

However, the bill further provides that the maximum rate of compensation that can be paid to any operator is 50 cents per airplane mile, which is 5 cents less than the present average rate per mile paid to all operators. This provision will kill initiative and effort on the part of the contractors to improve the quality of their service, inasmuch as this maximum rate of compensation is insufficient for the operator, using up-to-date equipment, to make a profit, or in many cases to break even. Regardless of the value of the service which an operator can render to the Government, the operator is thus faced with a continual struggle to make both ends meet. It is apparent that the Post Office Committee of the House of Representatives had this thought in mind as evidenced by the following passage from the Committee's Report on the Investigation of the Air Mail Service:

"It has been suggested that further to encourage commercial aviation and advance the art of flying a premium be paid to those carriers who improve their service with faster and more efficient airplanes of larger carrying capacity, greater passenger comfort, longer cruising range better instruments, and further adaptation of radio. The committee favors such advancement of the flying art."

The above idea, however, was not translated into the Kelly Bill.

The maximum rate provision should be eliminated and some provision made solely for the purpose of protecting the Government against inordinate profits by any air mail contractor.

A method is provided whereby operators not now carrying mail may be authorized to do so when such new routes do not duplicate present services, and in the judgment of the Postmaster General are in the public interest. It is required that such new services must carry an air mail poundage of not less than 25 pounds in order to justify their continuance. This feature takes care of the so-called "uneconomic" lines and insures the development of the air mail system on a sound financial basis.

At the present time there is no permanency to the air mail system, and the future after April, 1936, is indefinite in the extreme. This is an unhealthy situation. All this is corrected by the Kelly Bill which guarantees the permanence of all present existing air mail routes and gives assurance to the holders of route certificates, which under the provisions of the Kelly Bill may be exchanged for route warrants, so long as these routes are operated in accordance with the rules and regulations of the Post Office Department and are economically justified. It includes an important proviso which prohibits monopolies and assures healthy competition between the airlines.

Whenever an operator, prior to April 6, 1936, elects to surrender his present route certificate and accept a route warrant under the terms of the Kelly Bill, he may do so and thereafter receive the rate of two mills per pound mile. By accepting a route warrant on or before July 1, 1934, a contractor may receive a payment, in addition to the pound mile rate, equal to the difference between gross revenues from all sources and operating expenses prorated on a mileage basis, with these limitations: that the maximum of such excess payment shall not exceed 25 cents per airplane mile and that such payment shall not be made on account of any new services that may have been authorized under the terms of the Kelly Bill, and that all such payments shall terminate on June 30, 1939.

In round figures the air transport industry is earning an annual gross income of 25 million dollars. With elimination of all wasteful practices, and operations brought down to bedrock, this amount should permit the industry to live and continue to develop. It is estimated that in 1933 the air transport operators will receive six million dollars in revenue from passengers and express. This sum added to

(*Continued on following page*)

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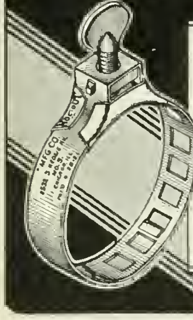

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(*Continued from preceding page*)

the 19 million air mail appropriation makes the 25 million dollars for 1933. The air mail operators should be able to increase their revenue from passengers and express by one million dollars annually; thus, it should be possible to reduce the air mail appropriation by an equal amount each year. Then, in five years, the commercial revenue obtained by the air mail operators should have increased to 11 million dollars and the air mail appropriation should have decreased to 14 million dollars. The latter figure, in 1939, should be exceeded by the return in postage to the Post Office Department. Then, the air mail service will be self-supporting and probably the only branch of the Post Office Department that is.

Numerous Senators and Congressmen have given the problems of the air mail and air transport industry their diligent and constructive attention. It is indeed fortunate for the industry to have these men at the helm of aviation affairs in the Senate and House. The House Committee on Post Offices and Post Roads has a particularly constructive and far-sighted view on aviation.

An editorial from the *New York Herald Tribune* of February 23, 1933, entitled "Economy and Airways," is timely enough to quote:

"Nobody seriously proposes to abolish the air mail. The chief question seems to be whether this activity is to be continued permanently on a subsidy basis, with new lines and extensions developed with government money as rapidly as the old ones begin to approach a self-sustaining basis, or whether the goal of a completely self-sustaining system is to be accepted now, with the corollary that all routes which cannot pay their way will ultimately be abandoned. The House Post Offices Committee, after a prolonged study of the subject, has brought in a tentative report recommending a complete revision of the mail payments. After urging that the rapidly pyramiding structure of aviation holding companies be prohibited, it proposes to base the mail payments again on the amount of mail carried rather than on the miles flown. By reducing the letter rates it hopes to increase the volume of mail for the chief routes to a point where these will be self-sustaining. For other routes the committee recognizes that a straight additional subsidy will be necessary at present, but it recommends that these subsidy payments be limited to five years, with the understanding that the lines which at the end of that period cannot live without the subsidy will be discontinued.

"Economically admirable though this plan may seem, it remains to be demonstrated that enough mileage can be made self-sustaining to keep up the aviation industry and provide for the needs of national defense. Aviation is not yet so expensive that it must be made self-sustaining at all costs, regardless of the non-economic factors which have led the nation to devote so much effort to its development and maintenance. The mail payments, it is true, have risen from $4,150,000 in 1928 to $19,460,000 for the current year; of this latter figure, however, only about $11,000,000 represents actual subsidy, the rest being met by the postal receipts. In the meanwhile the cost a mile has been going down, while the subsidy itself compares favorably with those paid by the various European powers for maintenance of their commercial airway systems."

The air transport industry was never in better shape to go forward, assuming the new administration's friendly attitude and cooperation on the part of the operators.

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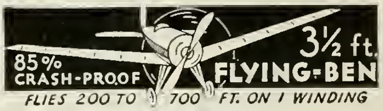

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Used Planes and Engines

GREAT LAKES de luxe 2T1A, West Coast: Lined cockpits, specially painted, extra instruments, streamlined, fast, less than 300 hours, privately owned, flying course included. AERO DIGEST Box 1496.

MONOSPORT KINNER, 100 h.p.: 95 hours, ship and motor. Guaranteed like new and perfect. Just recovered and licensed until December. Brakes, compass, air speed, navigation lights, metal prop. Priced to sell. Dr. Roy W. DeWelles, 531 No. Denver Blvd., Tulsa, Oklahoma.

FAIRCHILD 22: KR-34, Stinson Jr., Lockheed Sirius, Lockheed Vega, Aeronca, OX Bird, Lambert Monocoupe, J6-300 Cessna. Aircraft Sales Co., Hangar D., Roosevelt Field, Mineola, New York.

LA RUE FLYING SERVICE LISTINGS: J6-5 Stinson Detroiter, 4-place. Just completely overhauled and recovered; $2,150. Model R Stinson Jr., Lycoming; turn and bank, rate of climb, perfect; $3,500. Waco C Cabin, new; Continental 165, air starter, semi-airwheels and brakes, fenders, gray upholstery, seat covers, speed ring, bank and turn; 72 hours total time; privately owned; $3,500. Model S Stinson Jr., Lycoming; turn and bank, 90 hours since overhaul; S. D. speed ring; $2,250. J-5 Travel Air, recently overhauled, $1,450. Ryan Speedster, J6-5; 3-place, open, $1,200. Waco F Warner, $2,100. OX-5 Waco 10, less than 100 hours total, $600. Ryan B-1, J-5; recovered and overhauled; $1,950. J-5 Buhl, 2-place, perfect; $1,250. La Rue Flying Service, 2435 S. Michigan, Chicago, Illinois. Telephone, Victory 7637.

Miscellaneous Products & Equipment For Sale

LIBERTY MOTORS from $75 to $150. Hispano Suiza motors practically new, $75. Champion, AC, Splitdorf, all airplane plugs, 25c; each. Tires all sizes, $2 to $10. 20 x 4, 18 x 3, 14 x 3, 10 x 3 tires, tubes and disc wheels, complete, suitable for small airplanes or cycle cars, $10.50 each. Altimeters, $5. Tachometers, oil gauges, air speed indicators, compasses, goggles, helmets, flying suits, etc., etc., at less than cost. Parts for Wasp, Hornet, J-5 and J-6 at bargain prices. If it flies, we have it. Crawford Airplane Supply Co., Venice, California.

DON'T BUY anything until you get Ort's 1933 Aviation Material Catalog. Prices are lower. Send one thin dime today. Karl Ort, 671 W. Poplar Street, York, Pennsylvania.

BRAND NEW J-5 low compression pistons, with rings fitted. Make engine okay to burn automobile gas. Set of nine, $35. R. Kenyon, Newtonville, Massachusetts.

NEW three-bladed Wasp or J-6 300 Standard Steel propeller hub, $175. Bank and turn indicator, $30. Wiley parachute flare, $22.50. Good Commandaire wings. $25 apiece. covered. Moth fuselage, needs assembling, $40. K-6 Pitcairn Orowing, as is, $40. R. Kenyon, Newtonville, Massachusetts.

FOR SALE: Used Hamilton steel propeller for OX-5. Perfect condition. Best offer gets it, C.O.D. If not satisfactory return by C.O.D. within three weeks. Clarence O. Kvale, Decorah, Iowa.

COMPLETE LANDING FIELD EQUIPMENT: G. E. beacon, G. E. twin floodlight. beacon tower, boundary lights, Trenchlay cable. Missouri Gas & Electric Service Co., Lexington, Missouri.

SURPLUS STOCK: New Aeronca C-2 single seater wings, covered and doped, less ailerons, $100 per pair net, plus crating at cost. New Aeronca E-107A. 28 h.p. engines. less magneto and carburetor, $220 each, including box. New parts for Aeronca E-107A motors as follows: 4⅛ x 3/32 piston rings, 10c each; pistons, 4⅛ diameter, $2 each; cylinders, complete with valves and heads and fitted pistons with rings, $18 each, or $35 per pair. All prices f.o.b. Cincinnati. Aeronautical Corp. of America, Lunken Airport, Cincinnati, Ohio.

PRATT & WHITNEY PARTS: (B. Series): Cylinders (standard size), $10 each. New crankshafts. original crates, $15 each. Wright Cyclone 1750 motor, practically new, less mags, $300. Rebuilt OXX-6 motor, complete with Scintilla mags, $100. Waco 10 parts. Rising Sun Motors, H and Luzerne Sts., Philadelphia, Pennsylvania.

OX-5. CHALLENGER AND PARKS parts, all brand new: Wing panels, covered and finish doped, $50; center sections, $25; top engine cowls, $20: side and bottom engine cowls, $5; fin and rudder, uncovered. $10; landing gear (axle type), $15; gas tanks, $15; 26 x 5 tires and tubes, $4. Hundreds of other parts. Hammond Aircraft Corp., Ann Arbor, Michigan.

SEND $2.00 for complete shop blueprints of Stopes "Eagle," single seater high-wing monoplane. Flies successfully with Henderson motor. Al. Stopes, 545 West 146th Street, Apartment 53, New York, N. Y.

FOR SALE: New and used Waco, Travel Air, Swallow and Lincoln Page wings. Extremely low priced. New London Aircraft Co., New London, Ohio.

USED PARTS for Wasp, J6, J5, Cirrus, Gipsy, Challenger, Lycoming, Warner, Kinner and Szekely in stock. Aero Salvage Co., Glenn Curtiss Airport, Jackson Heights, New York.

PROPELLERS: Lowest prices in the country. Steel props for Warner, J5 and J6. Brand new late production Hamilton wood props for Warner, Kinner, Wright Whirlwind, Wright Gipsy, Hisso, Ryan Siemens, Anzani, American and English Cirrus, Curtiss Challenger, $20 each. Have almost every brand for any motor. Central Air Service, Battle Creek, Michigan.

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SCINTILLA MAGNETO, $20. Bosch magneto, new, with impulse, $20. These will fit Ford conversion. We can repair and calibrate your magnetos and instruments. Streed Electric Co., 1312 Harmon Place, Minneapolis, Minnesota.

TWIN FLOATS built for Aeronca model C-2 (single seater). These are brand new and still in original crating. Just a few of these left. Price $100, including crating, net cash, f.o.b. factory. Aeronautical Corp. of America, Lunken Airport, Cincinnati, Ohio.

SACRIFICE PRICES on new and used Eaglerocks and Flyabouts, aeronautical supplies and parts. Expert repair work our specialty. Aircraft Mechanics, Inc., Alexander Aircraft Factory, Colorado Springs, Colorado.

WASP C: Completely overhauled, with starter, not government surplus. Also 2 new Standard 3A1-12 props with hubs for J-6 300. Nearly new Warner 110 h.p. Also Kinner K-5 side exhaust, 16 stud heads. Will buy Kinner B-5, Szekely, J6-5, -7, and -9 cylinder or other late motors. Aviation Salvage Co., 1425 Grange Avenue, Philadelphia, Pennsylvania.

COMPLETE SET new pistons, pins, and Burd rings, OX-5, $5. New Berling platinum points, screw and spring set, $2.50. Goodyear Airwheels, 16 x 7 x 3, set two, $29. Knute W. Olson, 3504 Sixteenth Avenue South, Minneapolis, Minnesota.

Wanted To Buy Or Trade

TRADE Wasp or J6-300 Ireland cabin amphibion, with or without engine, for land plane. R. Kenyon, Newtonville, Massachusetts.

WANTED TO TRADE: Four-passenger Lincoln sedan and Curtiss Robin with J6-5 motor for six-place Travel Air or Bellanca. Address: Box 778, Fort Dodge, Iowa.

WANT: Low-priced, licensed two-place light plane, in good condition. Will consider plane less engine. B. Campbell, Box 123, Beckley, West Virginia.

WANTED: Miller OX-5 overhead, good condition and reasonably priced; Scully two-way communication set; Eaglerock shock cord and wing strut fairings. Watertown Air Lines, Watertown, South Dakota.

USED DAVIS PARTS WANTED: State condition of parts and send complete list. Will also buy a used two-place Aeronca. AERO DIGEST, Box 1488.

WANTED: Lambert or Warner Monocoupe, Warner or Kinner Cardinal, both A-1 condition, licensed. Must be cheap. Tell all first letter. C. L. Anderson, Kemmerer, Wyoming.

WILL TRADE 1932 Dodge DeLuxe sedan, 8 months old, low mileage, perfect condition, radio; for radial powered airplane. Box 266, Beach, North Dakota.

WANTED: Cracked airplanes. Fairchild, Waco F, Fleet, Travel Air cabin; also pontoons for same; southern territory; give details. N. M. Jones, 205 Laurel St., Sarasota, Florida.

HAVE $750 CASH for three-place plane, licensed and in good condition. State make, engine, total hours, equipment. What have you? Box 1736, 25 South Street, New York, N. Y.

CASH FOR Franklin Utility Glider. Damaged or undamaged. State price and send photograph showing present condition, if possible. Address AERO DIGEST, Box 1479.

WANTED: 125 h.p. Kinner B-5 motor in good shape. Give history of motor, condition, time and lowest cash price. G. S. Ireland, Port Washington, L. I., New York.

WANTED FOR CASH: Good two- or three-place licensed air-cooled motored ship. Give full particulars in first letter. Daniel Morris, Strathmore Hotel, Detroit, Michigan.

WANTED: Menasco Pirate C-4 motor, cheap for cash. State condition of motor completely. H. Dignowity, 117 North 8th Avenue, Pensacola, Florida.

WANTED: Used top wing, fin, flipper and rudder for Fleet. Must be licenseable. State condition and lowest cash price. Courtney MacConnell, Davidson, North Carolina.

WANT: Nicholas-Beazley Trainer (NB-8). Would consider Monocoupe or other light two-place monoplane. Give date manufactured and lowest cash price. Ben Herr, Lebanon, Indiana.

To prove . . .

IF YOU WANT to know what results other classified advertisers obtain through AERO DIGEST, watch this space each month. Each issue it contains a different statement by satisfied users of the classified columns.

> *"I have used AERO DIGEST ads several times during the past two years when looking for employment, and have never yet failed to obtain work through them. Only once did I have to run my ad in more than one issue. In fact, it is only due to AERO DIGEST classified ads that I have been able to get in time enough to hold my license during these 'lean years.'"*
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RATES: 10c per word, $2.50 minimum, payable in advance. Box numbers count three words. Initials, street numbers, etc., count one word each. For instance: Count *E. F. Simms*, 141 *South Huron Street, Detroit, Michigan*, as nine words. Forms for classified advertising in the April issue close March twenty-fifth.

CLASSIFIED ADVERTISEMENTS

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WILL PAY CASH FOR good used two- or three-place plane. Must be in first class condition and priced right. AERO DIGEST, Box 1493.

WANTED: Light three-place ship to use for training and passenger hopping at established airport on percentage basis. Ship to be flown by licensed pilots. State full proposition first letter. AERO DIGEST, Box 1494.

WANTED: Adjustable steel propeller for Warner 110 h.p. Must be A-1 condition. Address: Jack Lenkard, c/o Kendall Refining Company, Bradford, Pennsylvania.

WILL TRADE '32 Plymouth Special Coupe with wire wheels, low mileage, and add cash for good air-cooled ship. Give full description first letter. J. B. Walker, 920 Superior Avenue, Cleveland, Ohio.

$1,000 CASH for best Lambert Monocoupe offered me, Model 500 series. Give full particulars, age, condition of ship, instruments, hours flown, photograph, etc. C. L. Bradley, Dalton, Georgia.

PLYMOUTH SEDAN, 1932 late series, Philco radio, spotlight. Four months old. Will trade for any good two or three place airplane. Emmanuel Pierret, 1427 Richmond Road, Houston, Texas.

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TRANSPORT PILOT, graduate Army Flying School, Kelly Field. 650 hours military and commercial ships. Age 28, single. Go anywhere. Lt. J. H. Patterson, Langley Field, Virginia.

TRANSPORT PILOT: Age 30, single, 2,600 hours. Experienced instructor, all types. Good references. Will go anywhere. AERO DIGEST, Box 1480.

LICENSED A & E MECHANIC: Parks graduate, age 25, single, will go anywhere. Excellent references. AERO DIGEST, Box 1481.

NEWSPAPER MAN, L. C. Pilot: Desires position with large airport that is not completely sunk, as business manager—or should I say business getter? If you have good equipment, location and everything but business, write AERO DIGEST, Box 1482.

YOUNG MAN, 21, single, best references, desires position to gain practical experience on aircraft. Will travel; hard worker. Mechanically inclined; salary secondary. AERO DIGEST, Box 1483.

EXPERIENCED transport pilot, owning two-place cabin plane in excellent repair, desires connection with individual or company. Also experienced in oil business. References. AERO DIGEST, Box 1484.

TRANSPORT PILOT: 23; offers one year of his services for living expenses; must fly 30 hours monthly. Best of references. W. R. Ramsey, San Angelo, Texas.

TRANSPORT PILOT, college graduate, A & E license; good habits and clean record. Fly anything licensed, anywhere. Know radio. Sales experience. Take anything aeronautical. AERO DIGEST, Box 1491.

RELIABLE TRANSPORT pilot wants to buy or lease three- to five-place amphibion or seaplane. Good references. Ship must be licensed and a real buy if bought. AERO DIGEST, Box 1492.

TRANSPORT PILOT, excellent mechanic, desires position as instructor and contact man for Central and South American students. Native of Argentine. Two years college; 400 hours instruction, passenger and charter flying. Age 23, single. Consider foreign connection. J. Alvarez, 2320 Eighth St., N. E., Canton, Ohio.

GRADUATE MINING ENGINEER and transport pilot, 34 years old; 4 years practical mining and 4 years flying experience, plus ability to set up prospectus, develop and obtain financing in one of these fields; desires new connection where above experience can be used to advantage. Now employed general superintendent mining contractors where above experience cannot be fully utliized. Available 60 days. Write AERO DIGEST, Box 1495.

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LOWEST PRICES on repair or recovering work consistent with expert workmanship. Let us submit an estimate. Department of Commerce Approved Repair Station. Aircraft Mechanics, Inc., Alexander Aircraft Factory, Colorado Springs, Colorado.

OPPORTUNITY for pilot to take over student business and licensed N-B Trainer for only $600. Also have special suped up OX-5 for sale cheap. Jimmy Hays, Ponca City, Oklahoma.

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PARACHUTES: Approved type. Seat, back, lap and chest; bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

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BEAUTIFUL ornamental scale models of the F9C-2 Akron Fighter. 12-inch span. Only $3.50 postpaid. Illustrated folder on request. Sykes Kennon, University P. O., Mississippi.

HAVE TWO PRIMARY Trainer Gliders, factory built. Both new, being only test flown at factory. Make offer for one or both. Bob Curry, Seymour, Indiana.

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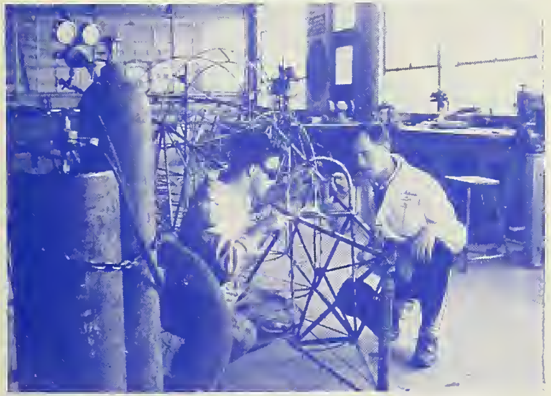
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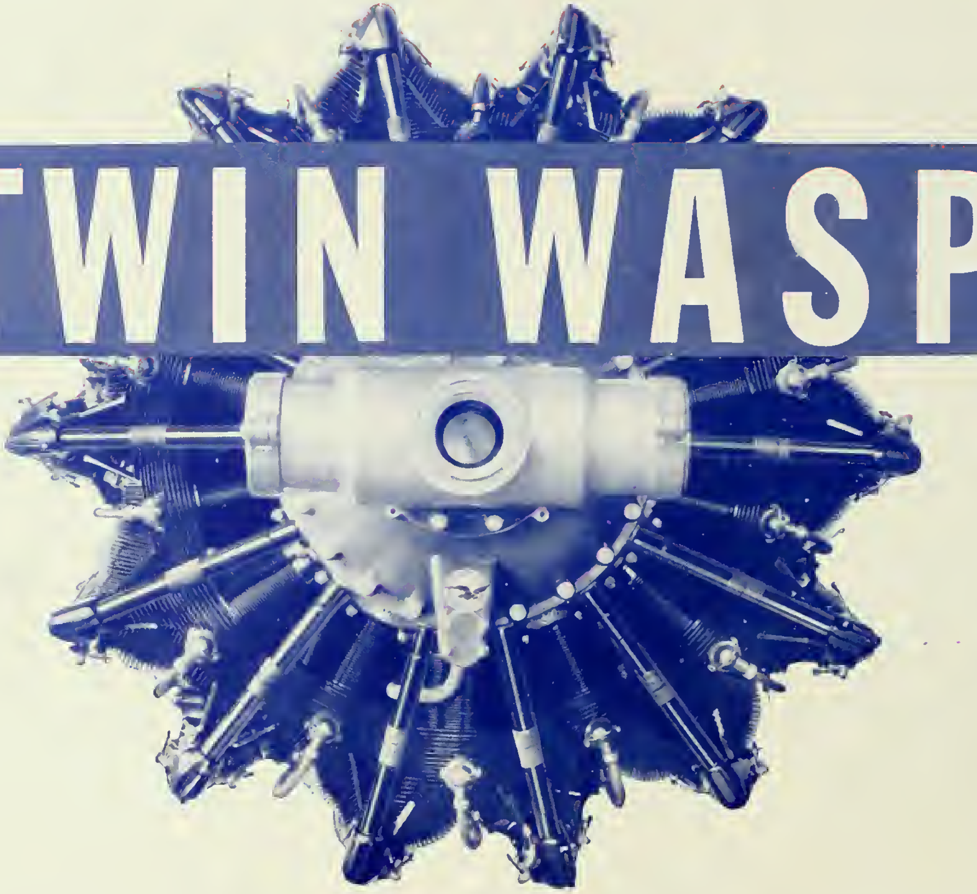

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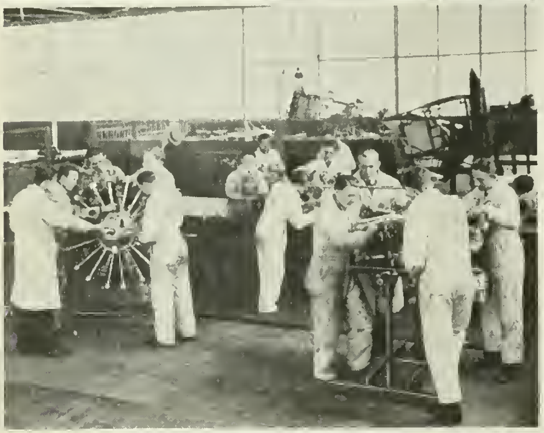

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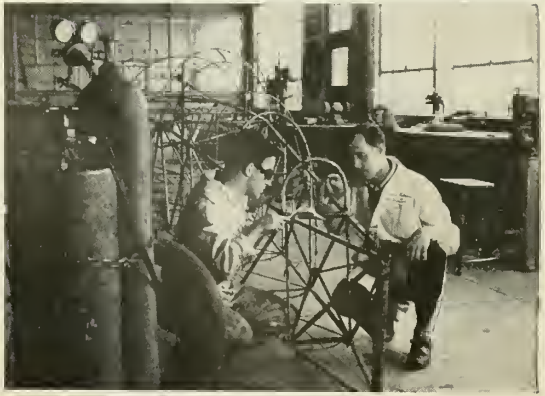

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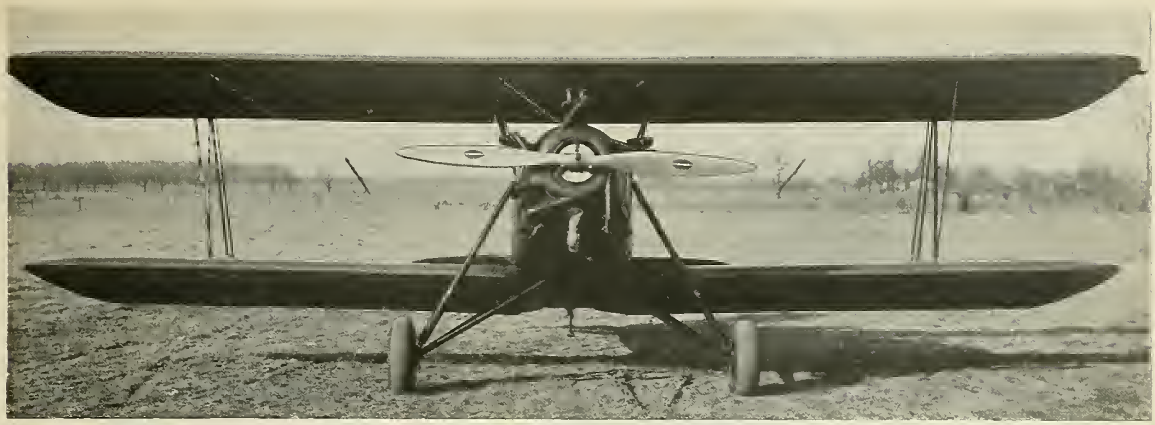

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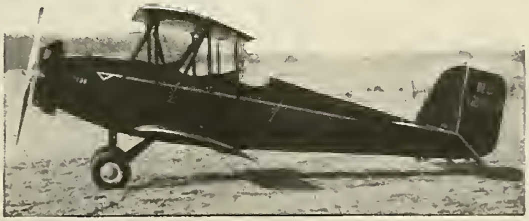

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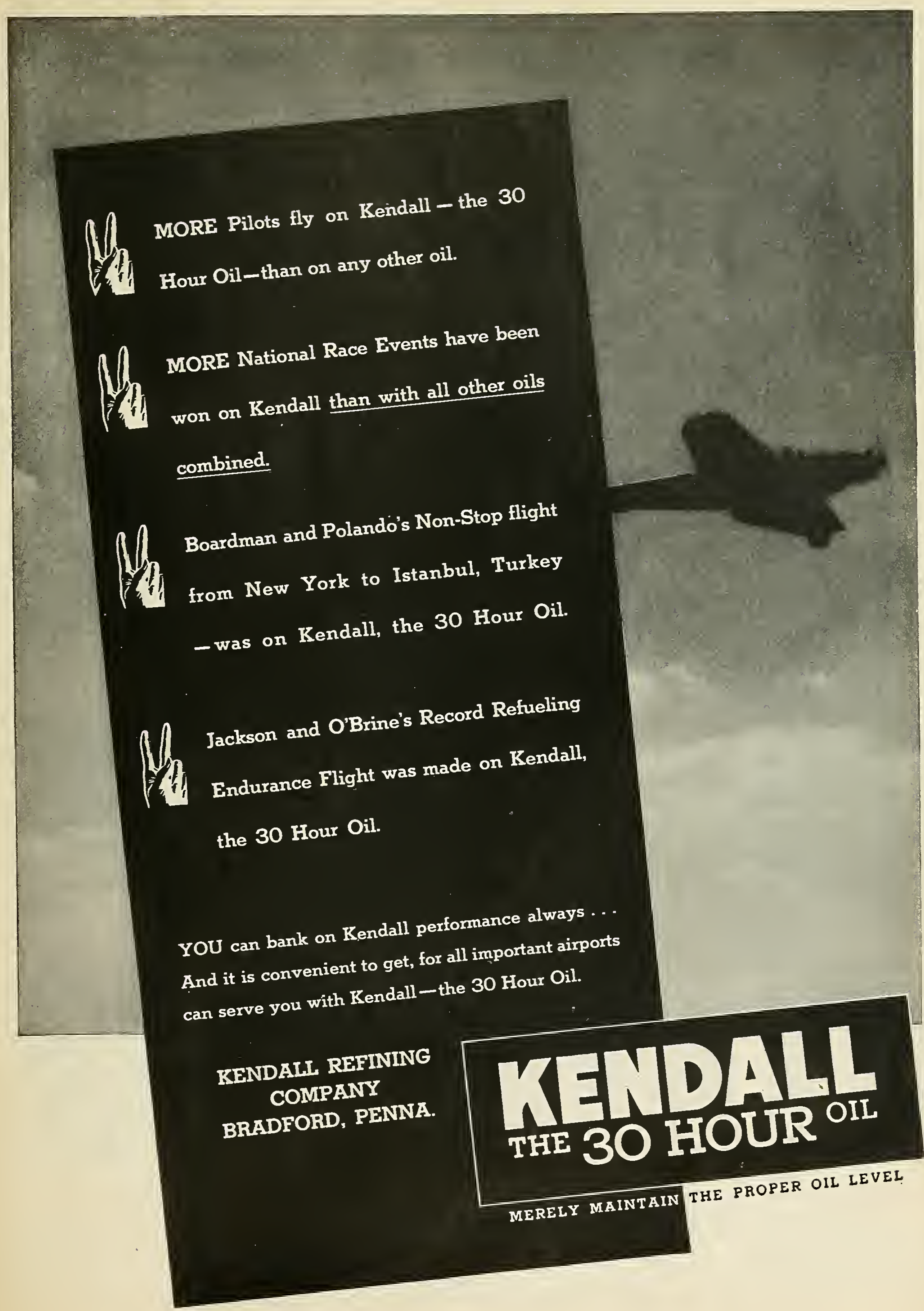

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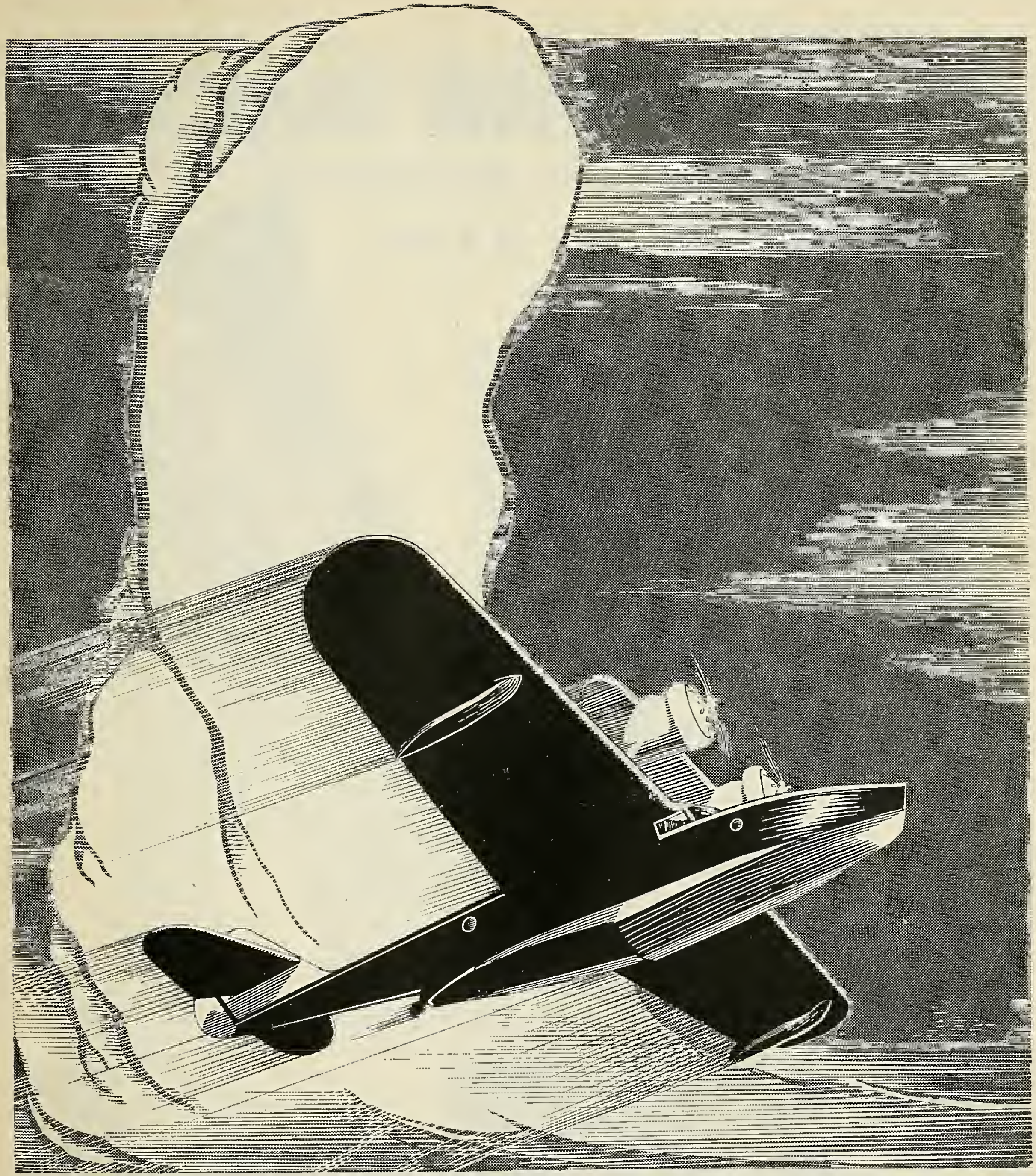

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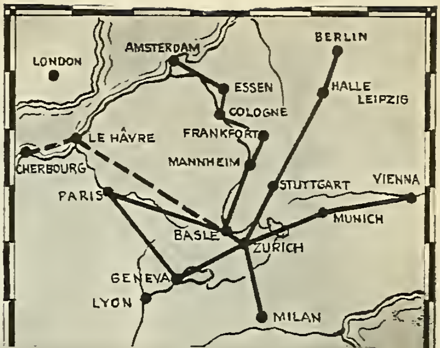
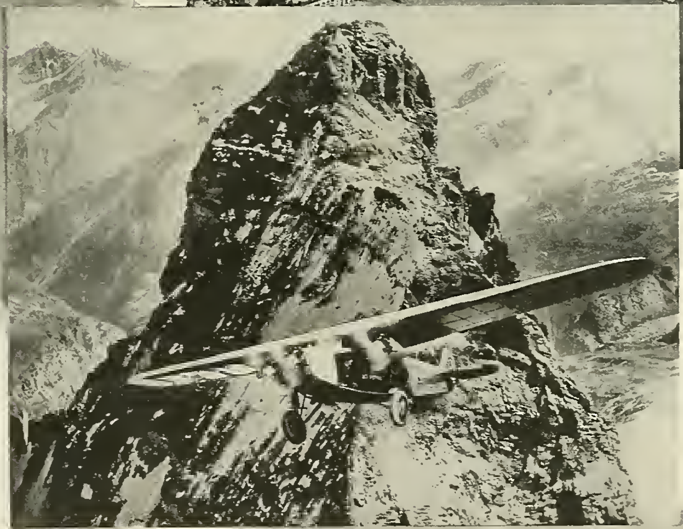


Map of "Swissair" Routes

"Swissair" Lockheed Orion over Zurich, Switzerland.



"Swissair" three-engined Fokker flying around the famous Matterhorn. The Matterhorn, one of the Swiss Alps, is 14,661 feet high.

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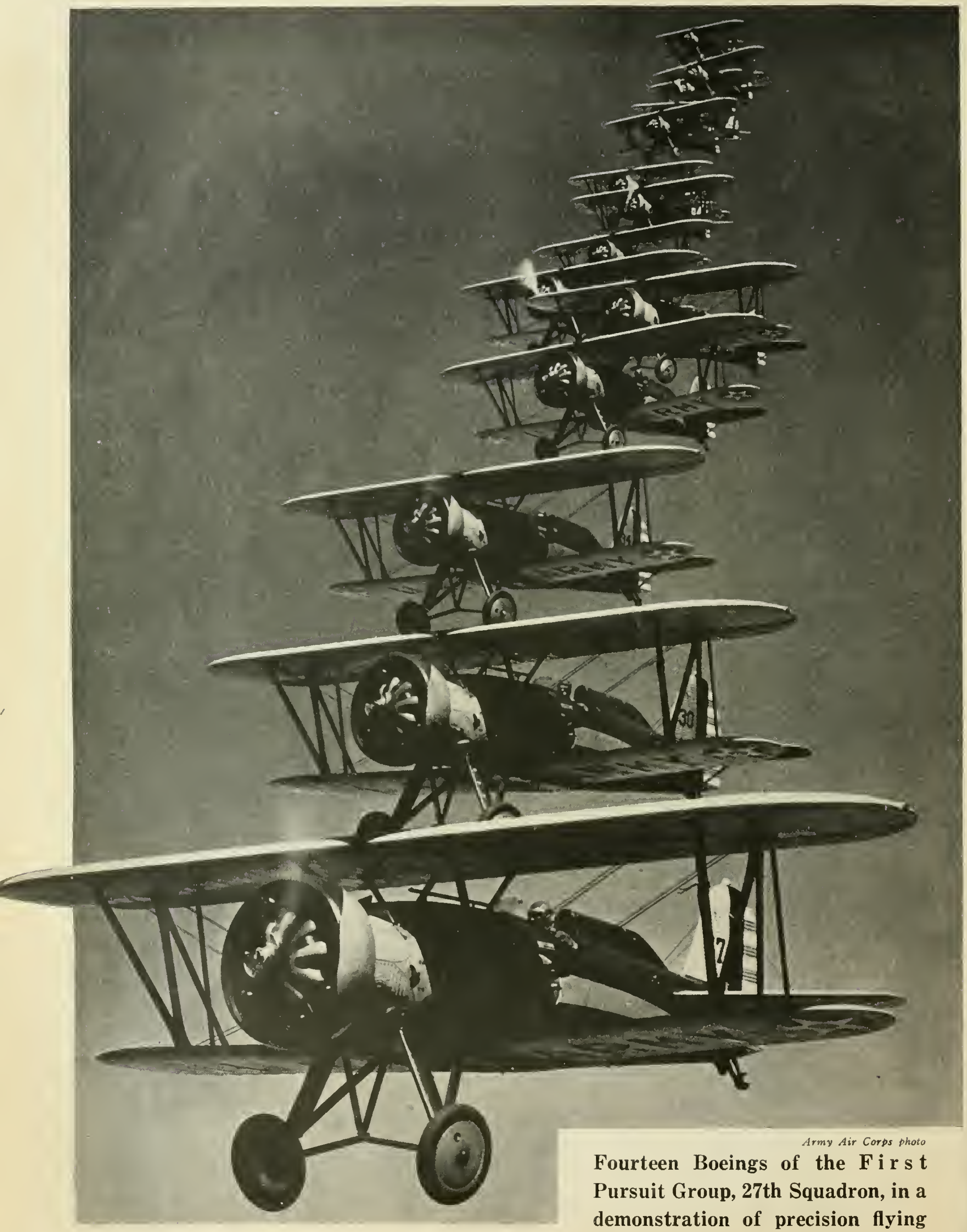


Army Air Corps photo

Fourteen Boeings of the First Pursuit Group, 27th Squadron, in a demonstration of precision flying

U. S. ARMY PURSUIT AVIATION

Major General James E. Fechet, U. S. Army (Ret.)

PURSUIT aviation is that branch of the air force which has as its object the destruction by *offensive action* of hostile aircraft in flight. Its purpose is to cooperate in establishing and maintaining aerial supremacy in the field of operations. Its mission is accomplished when its supported air forces can operate freely without excessive losses, and when the hostile air forces can operate only at the risk of disastrous losses.

Before the World War, while most military authorities admitted that airplanes might be used for reconnaissance, messenger service, the regulation of artillery fire and the transportation of staff officers, they contended that aerial combat was a dream of theorists. They ignored the fundamental principles that for every instrument employed in warfare a similar instrument employing the same medium of operation is invariably developed as a counteracting measure and that information obtained on the field of battle must usually be fought for.

Experiments were conducted at College Park, Md., in 1911 by the few pioneer fliers in an Aviation Section of the Signal Corps, first with rifles and then with machine guns mounted on an airplane and successfully operated in the air.

These fliers said: "We should construct special combat airplanes to carry offensive weapons so that we may develop sound tactical principles for their employment." Military authorities, ever conservative, held that the main function of all aviation would be to act as the "eyes of the Army."

All air units involved in the early part of the World War were used to obtain information, and the flying personnel were instructed to avoid conflict rather than fly into enemy territory with that purpose in view. Several aerial shotgun and pistol duels were reported as having been fought in the first few months of the war. On August 14, 1914, "an indecisive duel occurred between a German and a French machine, the latter using a Browning pistol." A report on August 28th described the shooting down of an unsuspecting Germany pilot by an English pilot armed with a pistol. The suggestion is made that these and similar reports were made for morale-boosting propaganda purposes only, but it is quite probable that such aerial battles occurred then, as we know they occurred in 1915 and later.

After it was realized that the airplane was an indispensable factor in obtaining information and directing artillery fire, steps were taken by each belligerent effectively to counteract the work of aircraft so engaged. France, England, Germany and Italy started the development of fast and highly maneuverable aircraft from which the enemy would be shot out of the skies. Even with the special equipment, most of the early encounters were indecisive.

The first pursuit combats were carried out by pilots working alone, relying upon their individual skill to trap the unwary opponent. Ball (English), Guynemer (French) and Boelcke (German) were such air duelists. As the methods of the individual fighters became known, observation and other pursuit pilots used increasing vigilance, and it became more and more difficult for the attacking pursuit pilot to approach from a position of advantage and deliver a surprise attack.

Two or three pursuiters then worked in a team. One plane flew some distance below his fellows as "bait" to tempt the enemy airman, and if he yielded to this temptation and flew toward the single airplane, the more experienced pilot or pilots flying 2,000 feet higher dived down and thus delivered a surprise attack in turn on the first attacker. These tactics became known even more quickly than "cloud-hiding" and "sun-gazing," and the novice would be forewarned of its character.

There then came the demand for increased pursuit forces in order to allow a large number of airplanes to operate aggressively over the front within certain well defined boundaries, as "barrage patrols." Considering the number of airplanes necessary successfully to accomplish a perfect barrage over a broad front, twenty-four hours a day, every day, it was obvious that such a scheme would be found impracticable. The unlimited dimensions of the area to be covered in the air prevented successful accomplishment.

In the development of the aerial barrage idea, the "alerte system" came into being. This contemplated providing protection for specially important areas and a means of reinforcing units which were hard pressed in combat.

By the time the alerte formation had climbed to the altitude and the place needed, the enemy had usually withdrawn or completed its mission. Even when using advance airdromes the alerte system was unsuccessful, because the enemy could send in attack planes requiring only a few minutes' work about five miles back from the front, and these marauders would be well back to their home airdromes before information had been relayed to the alerte squadrons and they had taken off.

When it was realized that pursuit aviation could not form an effective aerial barrage, nor even act as an interceptor to specific air operations of the enemy, the Allied pursuiters, and the small amount of American pursuit then at the front, flew where and when they expected to be most effective. Due consideration was given to the fact that at known times enemy reconnaissance planes would most likely be seeking information of certain reserve areas, or that enemy bombers would be appearing over the lines and flying at certain attractive objectives, but into country unfamiliar to them, at about dawn each morning, or that the enemy pursuiters could hardly afford not to take a chance at strafing troops which they were certain would be on the march along a certain road at a certain time.

That is how pursuit takes the air, in the present concepts of its employment. The staff which organizes the air force for any offensive finds that only so much pursuit aviation is available. Of this available pursuit, so many airplanes can fly so many hours a day. These airplanes, then, must be in the air at places and at times when ex-

A formation of Curtiss P-6E pursuit planes by the 17th Pursuit Squadron, Selfridge Field, Michigan

perience has shown that they will be most likely to meet air forces that they can vanquish.

As the "aerial barrage" and "interceptor" ideas were succeeded by the present plan, described above, so were the single airplane and the two- or three-plane formation succeeded by the large formation, and this in turn by the "chain" system. In the chain system, airplanes were stepped up in altitude by flights or squadrons, the lower formation engaging the enemy, with the upper ones acting in support or reserve of those in assault. This system was found to be effective where the enemy aircraft were at a lower ceiling than the lowest echelon of the attacking pursuiters, but where the enemy aircraft were also pursuiters and able to climb higher than the ones who intended to do the assaulting, then the tables were turned.

The chain system was also carried out with an unreasonably large number of steps, until the upper echelons were so far away from the lower ones that they lost track of what was happening to them. This was the case when the World War ended, and a large number of World War pilots still believe in the efficacy of pursuit tactics whereby a group of seventy-two airplanes sweeps through the skies with each six-plane flight stepped up and behind the preceding flight.

Pursuit tactics are even now undergoing a change, brought on by the impending presence of 200-mile-an-hour (or faster) bombers. It is true that the Boeing P-26, and it is most probable that the Curtiss XP-934 (the latter recently received at the Air Corps Materiel Division for test) are considerably faster than our latest bomber. Let us assume they are 25 miles an hour faster. We know, however, that a 25-m.p.h. advantage is not really as effective in the 200-m.p.h. speed range as it was when bombers did 100 and pursuiters 125 miles per hour. Undoubtedly bombers will travel faster than they do now, but so will pursuit aircraft.

We may well be proud of our new crop of pursuit airplanes. American service pilots invariably demand plenty of strength and good vision. Speed is subordinated in some degree to these two characteristics, although the need of speed in a pursuiter is paramount.

Some of the necessary characteristics which must be considered when the designers and builders evolve a new pursuit model are speed (at high altitude), maneuverability, rate of climb, factor of safety, visibility, ceiling, ease of maintenance and endurance.

In regard to the performance data of some of our pursuit aircraft, a number of figures can be given for each particular airplane tested. If the propeller pitch is changed, even slightly, it may increase the rate of climb but cut down on the straightaway speed. In the tests for the rate of climb to 15,000 feet heavy oxygen apparatus is often carried along when such oxygen is not used by the pilot unless operating higher than 15,000 feet altitude. Either a gratifying set of performance charts or a series of conservative results can be obtained, and either will be honest and correct. In evaluating a pursuit model, we should give each of the eight characteristics a certain value, and

Line up of fourteen Boeing P-12-E pursuit plane s powered with Pratt & Whitney Wasp engines

B/J two-seater pursuit plane type P-16 and the Boeing single-seater pursuit type P-936

then flight test the airplane accordingly, as each nation regards the essential characteristics of a pursuit airplane differently from us.

Complete performance data on our military airplanes is not made public until *after* the type in question has been in production for one year. These conservative figures on a type that is over one year in existence are often compared with the figures *reported* by the manufacturer of some other type used by some other country. Yet last year the Boeing P-12 was the fastest pursuit airplane in the world with an air-cooled engine, *using certain methods of rating.*

Performance data on the P-12F is not released, but it is known to be better than the E. The Boeing P-26 is a bit faster than those pursuiter airplanes of other powers and quite a bit stronger. The Curtiss XP-934 gives equal promise.

These advanced types, however, are not in production. One here, a half-dozen there, yet not enough to equip the 1st, 8th, 17th or 20th Pursuit Groups. The new models are bargains, and it would be disheartening should funds be lacking with which to buy enough of them to make their presence felt in developing a new technique against superplanes of the B-9 and A-8 types.

In general, the single-seater is still the backbone of pursuit models, and besides the Boeing P-12 series, we have the Curtiss P-6E with prestone-cooled Conqueror engines of 600-700 horsepower. Two squadrons are equipped with P-6E's, one in the 1st Pursuit Group, the other in the 8th Group. One squadron, the 94th in the 1st Group, has B/J P-16 two-seaters, and the other pursuit squadrons in the Air Corps are generally equipped with the Boeing P-12E's. The two-seater, as the B/J model, offers certain advantages of continuous fire power that single-seaters lack.

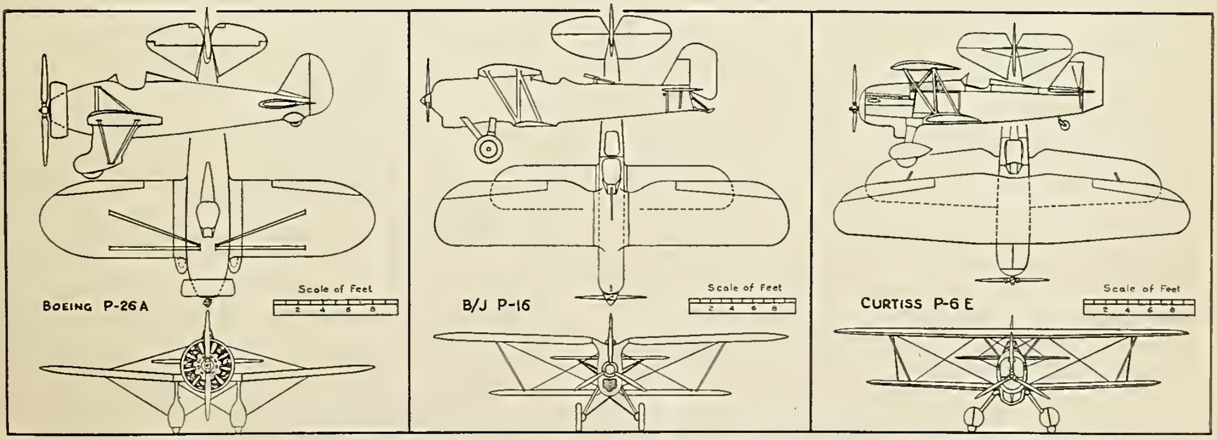
Our pursuit organizations in the Air Corps are located as follows: 1st Group (17, 27, 94 Squadrons), Selfridge Field, Mt. Clemens, Mich. 17th Group (95, 34, 73 Squadrons), March Field, Riverside, Calif.; this group and 7th Bombardment Group form the 1st Bombardment Wing. 8th Group (33, 35, 36 Squadrons), Langley Field, Va.; this group and 2nd Bombardment Group form the 2nd Bombardment Wing. 20th Group (55, 77 Squadrons), Barksdale Field, La.; this group and 3rd Attack Group, now at Ft. Crockett, Tex., form the 3rd Attack Wing. 18th Group (6, 19 Squadrons), Wheeler Field, Hawaii. 3rd Squadron, Clark Field, P. I. 24th and 78th Squadrons, France Field, Canal Zone.

In the 1932 fiscal year the following pursuit airplanes, together with the necessary spare parts, were purchased:

101 Boeing Model P-12E and P-12F......	$2,158,194.73
10 B/J P-16 (two-seaters)...............	496,337.71
46 Curtiss P-6E.........................	1,407,035.82
4 Consolidated P-25.....................	223,301.31
3 Boeing P-26..........................	118,432.74
1 Detroit P-24 (two-seater)...............	30,200.00

As many of the above models were new ones made for single order or limited production quantities, their unit prices are necessarily higher than that of the 101 Boeing P-12's.

As it is hoped to build up our pursuit aviation with modern airplanes, so it is hoped to complete temporarily the Air Corps organization by the formation of five new squadrons, the 79th at Barksdale Field, two squadrons in Panama and two in Hawaii. The "Five-Year Program" is already on its *sixth* year, yet the program is behind its goal, due to restricted appropriations.



Three-view scale outline drawings of the Boeing P-26A, the B/J P-16 and the Curtiss P-6E pursuit planes

AIR—HOT AND OTHERWISE

FUTURE CHANGES IN OUR INDUSTRY

By

Frank A. Tichenor

THE immediate future fate of aviation in the hands of the new Administration at Washington represents a situation on which it is dangerous to hazard a guess. It has not been surprising to us that this question has been held in abeyance while the government under President Roosevelt has gone to work on more pressing problems pertaining to the immediate economic welfare of the people. At the time of going to press none of the three under-secretaryships for aviation has been filled by the new President. Many conflicting rumors have been flying around Washington since March 4. "Air mail subsidies will be taken away." "Large indirect aid to commercial aviation can be expected." "The aviation under-secretaryships will be permitted to lapse, and the cause of aviation will be lost in bureau consolidations dictated by national economy." "President Roosevelt is in favor of a 900 naval plane fleet in building up our sea forces." These are a few of the unconfirmed and conflicting reports which have been coming out of Washington in recent weeks.

In this situation of uncertainty there are a number of definite and useful things which the aeronautical industry can do; and there are certain equally definite things which it should *not* do. It should not adopt a panic attitude. It should not presume to see in the situation an occasion to exercise selfishness. It should not see a highway robbery opportunity for the individual to plead his own cause and grab as much individually as he possibly can on the assumption that the situation justifies such action. There was never a time when it was so essential for the entire industry to work on a united plan for the common good.

Now is the time for aviation to adopt and support continuously a definite program. Air mail subsidy must be restored. But in requesting such restoration from Congress there should be some unanimity among the operators of a definite goal in exchange for such Federal support. It is time that we agreed that the airlines desire the continuance of the air mail arrangement until we can make the airplane the common carrier of a large portion of all first class air mail for distances of 500 miles and over.

It may eventually be—we are not saying that it is now—to the common good to eliminate the air secretaries of War and the Navy. We may see that national economy dictates the merging of bureaus and bureau duties within departments. American aviation will not play the role of obstructionist, but it has a duty to see that in the making of such changes our air strength is not neglected and crippled, and that we are not returned to the intolerable conditions which existed before the Morrow Board investigation. If it appears wise to accept the abolition of the post of assistant secretary which has been vacant since the retirement of Dave Ingalls, the men in American aviation should make it clear that such acceptance does not mean approving the collapse of the entire structure, the elimination of a Bureau of Aeronautics in the Navy and the return of air control to the unfriendly old line Admirals.

There is nothing in the current attitude of the Administration toward aviation to inspire panic or doubt. We must not forget that President Roosevelt, when he was Assistant Secretary of the Navy, was active in the pioneer development of air strength in the Navy. It was during this earlier government service that he developed the interest in flying which has made him the aviation enthusiast which he is today.

However, enthusiasm of our leaders alone cannot be counted upon unless American commercial aviation is prepared to give definite proof of its ability to carry the task which has been assigned to it. Spokesmen for the aeronautical industry are rather fond of citing the historical fact that American civilian aviation developed so rapidly after the War that the Government, after establishing air mail through the use of army equipment, after an extremely short time was able to turn this work over to the commercial companies under contract.

A fact, however, of which they seem to lose sight is that the process might easily be reversed. The idea is not as far fetched as it may seem. There is little in the existing setup which would prevent an immediate return of air mail carrying to army fliers, and there is much in such an arrangement to appeal to a government committed to a policy of drastic economy.

The proponents of a strong civilian aviation structure have harped for many years on the sterling value of the training which transport of mail through the air gives to our civilian pilots. Why should not the same training be of value to military pilots?

It comes to mind that because of the peculiar special experience and training which the civilian air mail flier has always received in continuous cross-country flying, this experience would be valuable to the military aviator. Since flying the air mail was taken away from army pilots, after the early brief experimental stage, the chiefs of the Army Air Corps have been frequently hard pressed to find reasons for sending their men cross-country. This led to the alleged costly practice of questionable junkets and the almost inevitable attendance of large sections of the Army Air Corps at various air meets at civil fields. Such flying, of course, was justified on the basis of its value in obtaining experience. The proposal to return air mail to our military fliers would prove a handy and satisfactory answer to the criticism frequently leveled on "air junketing" by military pilots.

George H. Dern, the new Secretary of War, in a recent address at Chicago, said, "The air force of the United States should probably be superior to that of any other power in the world." With men of such enlightened viewpoint toward aviation at the head of the new Administration, it would seem that our aviation industry has little to fear concerning the future of flying.

RADIO AIDS FOR FOG LANDINGS

PART II. USE OF THE COMPLETE SYSTEM, AND PERFORMANCE DATA

(Continued from the March issue)

By Harry H. Blee

Director of Aeronautic Development
United States Department of Commerce

LET us consider the operations required on the part of a pilot in making an "instrument landing" with the aid of this system. It will be assumed that he is flying east from Cleveland and has located himself directly over the Hadley Field aural type radio range-beacon by means of the "zero signal" indication. The medium-frequency receiving set is adjusted for manual volume control operation and the aural beacon signals are received through the headphones. Upon locating the Hadley Field station, the pilot follows the northeast course of the Hadley beacon, which takes him to the vicinity of Newark. When within roughly 10 miles of the Newark airport, he changes to automatic volume control operation and tunes the medium-frequency set to the frequency of the Newark runway localizing beacon. Visual indication of the position of the airplane with respect to the runway localizing beacon is now obtained by means of the vertical pointer of the combined instrument. The "land-flight" switch is in the "flight" position, so that the horizontal pointer of the combined instrument acts as a volume indicator and informs the pilot that his course indications are reliable. The distance indicator reads nearly full scale. Since the scale divisions correspond roughly to miles when used on the runway beacon, this reading indicates that the airplane is more than five miles from that beacon.

By means of his two-way radio telephone, the pilot communicates with the airport to learn whether the field is clear for his landing and to obtain such information as wind direction and velocity, height of ceiling, visibility and barometric pressure. He now orients himself along the runway beacon course and maintains an altitude of about 2,000 feet or less. In a short time he observes that the distance indicator reads roughly five miles from the runway beacon and thereupon throws the "flight-land" switch to "land" and watches the horizontal pointer of the combined instrument for landing path indications. As the horizontal pointer nears the "on course" position, he begins to make suitable reduction in speed preparatory to his glide down the landing path.

When the horizontal pointer reaches the "on-course" position the pilot knows that he is on the proper landing path and maneuvers the airplane to maintain this path by keeping the intersection of the two pointers of the combined instrument within the central circle on the instrument face. Meanwhile, the deflection of the distance indicator decreases, showing that the airplane is approaching the airport. When within 2,000 feet of the landing area, the pilot suddenly hears through his head-phones a note of medium pitch (1,000 cycles). The signal intensity increases rapidly, decreases through zero, and then passes through a second maximum. This is the marker beacon signal and gives the pilot accurate indication of his distance from the airport. The airplane is now at a height of about 100 feet. At the edge of the landing area a second marker beacon signal is heard, this time a note of considerably lower pitch (250 cycles). The height of the airplane is now about 45 feet.

Knowing his position in three dimensions, the pilot may elect one of two procedures for landing. The first is to settle below the landing path "course" and thus feel his way to a landing. The second is to continue to follow the landing path "course" until the wheels of the airplane actually contact the ground. If the second alternative is adopted, the distance of the point of contact from the boundary marker beacon will depend upon the height of the landing beam receiving antenna, being an inverse function of this height.

The above analysis of the pilot's maneuvers during a landing is based on a case in which the airway radio range-beacon is located at a considerable distance from the airport. Were the beacon in close proximity to the airport, the maneuvers would be somewhat altered in that the pilot would first locate himself by means of the "zero signal" indication over the beacon and then, after returning to the frequency of the runway localizing beacon, would circle the runway beacon in a counter-clockwise direction and at fixed radius until intercepting the course corresponding to the desired landing direction. Thereafter the operations would be the same as outlined above. During the circling maneuvers, the distance indicator is of considerable assistance in maintaining a constant radius with respect to the runway beacon station. (*Continued on p.* 68)

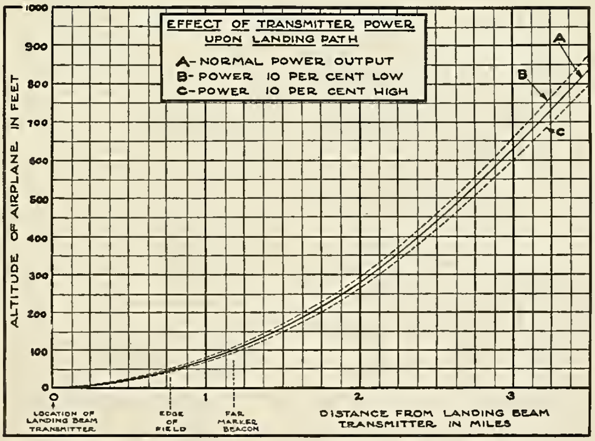


Fig. 9. Graph illustrating the variation of the landing path as a function of power output at the landing beam transmitter

EXPORTS of AERONAUTICS PRODUCTS

LEIGHTON W. ROGERS
Chief, Aeronautics Trade Division
United States Department of Commerce

LAST year's exports of United States aeronautics products, including complete aircraft, separate engines, parts and accessories as well as parachutes, were valued at $7,946,533, an increase of 65 per cent in the valuation of such exports in 1931. The 1932 figure was but 10 per cent less than the $8,806,396 total export valuation for 1930, which was the peak year for such shipments. Brazil was the leading market for planes, Japan for parts and accessories and Belgium for engines.

The total valuation of the 280 complete aircraft exported in 1932 was $4,358,967, as compared with $1,812,827 for the 140 exported during the preceding year. Accordingly, the unit increase was exactly 100 per cent and that for valuation 140 per cent.

Contrary to general belief, by no means the majority of the aircraft exported were for military purposes. Although 170 or 61 per cent of the 280 planes exported in 1932 were consigned to governments, at least thirty of those so consigned were of types unsuitable for combat purposes, being intended for use on government-operated airlines and other non-military uses.

Brazil, a country which purchased but one U. S. airplane in 1931, was the leading market in 1932. It was Great Britain and Italy which obtained the major portion of Brazil's aviation business in the previous year. France formerly had accomplished large sales in that market, as for several years there was an official French military aviation mission in the country.

Turkey, which until 1932 was never an important market for complete American planes, was the second market in importance, taking 26 aircraft valued at $432,459. This business came as the result of several years of sales promotion effort by one United States firm. Training planes, high-speed single-seaters and several multi-engined transports were included in the shipments to Turkey, the contract for which included the pioneering operation of an airline in Turkey by American personnel.

Bolivia, the third market in importance, purchased several large transports as well as some military equipment. Colombia followed Bolivia in importance as a market, taking nine aircraft valued at $191,500. These ranged from a large flying boat to a small two-seated cabin monoplane. Germany was our principal competitor in Colombia in 1932, some of the German planes sold there being equipped with American engines. Hongkong (the fifth market in importance), to which six United States airplanes were exported at a valuation of $189,793, was the shipping destination for an all-metal tri-motored transport, subsequently delivered by air to a marshal in North China who has been using it for personal transportation. Five observation planes also were sent to Hongkong for delivery to a southern provincial government which had the national government's authority to receive them.

Mexico, which came seventh in order of valuation importance, imported low-priced aircraft largely for civil training and sport use as well as a few transports. The sixteen planes which went to China, the eighth market, were all light training models of a type in wide use in the United States for civil training purposes.

These American training planes are being used by the Chinese National Government's flying school, where American instructors are employed. Twenty Italian bombers also were ordered for the use of the school. They were paid for, it is reported, from Boxer indemnity funds.

Canada was ninth in importance, having increased its takings by three planes ($80,583 worth) over the 16 units valued at $62,394 exported there in 1931, as compared with the large total of 63 valued at $673,776 in 1930. Argentina, the Philippines and Germany followed Canada in importance as markets for complete aircraft.

Japan, which was the major one of 74 export markets for aeronautics parts and accessories in 1932, replaced Canada in the lead in this category. The valuation of shipments to Japan was $346,495. Canada's total in 1931, when United States shipments of these products went to but 61 countries as compared with the 74 in 1932, was $292,712, while in 1932 it dropped to $89,019. Brazil was second in 1932, taking $286,489 worth; Argentina was third with $191,850. Mozambique, Surinam, British Malaya and Palestine were among the lesser markets for these products. In Japan, where the interesting anomaly exists that British engines are used in American commercial cabin planes and American engines in planes of Dutch manufacture, the tendency is toward producing every aeronautical product possible within the country. This accounts in part for the increase in accessory parts shipments to Japan, there being certain items not yet available from Japanese factories. Brazil entered the parts market so strongly during 1932 due to the appreciable shipments of American planes there. Early in the year an American pilot-salesman went to Brazil with a shipment of five small commercial planes for operation on an intra-Brazilian mail route. He remained to set up and test the planes and happened to be there at the opportune time for obtaining business for the American aeronautics industry when the situation called for purchases of military equipment. In the face of strenuous competition from European manufacturers, who were successful in selling over 20 military and training aircraft, this American firm sold over 60 planes of various models to Brazil. These airplanes were of a type not sold to the United States military services but were in wide use for training and sport purposes in the United States. This incident shows how necessary it is sometimes to have factory representatives in the field (or at least a good local agent) and applies not only to the sales promotion of aircraft, but also for parts, accessories and engines. Another type of plane purchased by Brazil in appreciable quantities from the United States last year was a single-engined cabin monoplane for photographic, observation and transport purposes. With each plane shipped there was a certain quantity of spare parts, which accounts for Brazil's

(Continued on page 66)

AERIAL MICKEY MOUSE CLUB

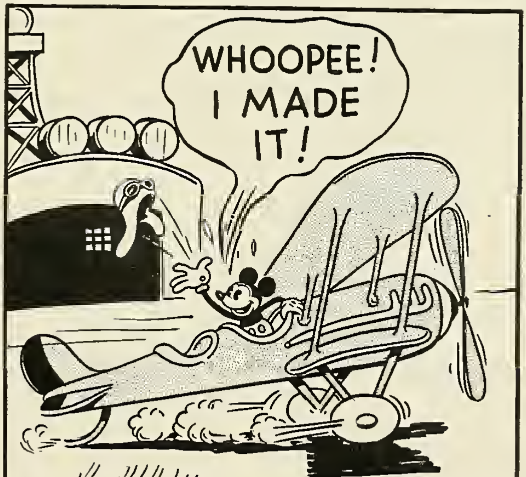
By

Cy Caldwell

TOILING away night and day throughout the length and breadth of our land are millions of field mice. They are doing a great and noble work. They are helping the farmer. The farmer may not always appreciate such efforts. On the contrary, Uncle Hiram has been heard to remark, "Drat them pesky mice! They eat my grain." But if they didn't eat it, the world's surplus would be even greater. And the farmer, already cursed with too much wheat, would starve even more rapidly than he is starving today.

Therefore, in a world that is largely and lavishly insane, when the more we raise the poorer we are, when the less we grow, the richer we become, because the price is higher, it must be evident that the lowly field mouse is an important factor in the economic plan or lack of plan. But for his magnanimous efforts, the price of wheat would drop to even lower levels and there would be far more misery in the land. So, always ready to appreciate and to commend the worthy, I raise my voice in a stentorian shout, "Hooray for those mice! Three rousing cheers and another bag of oats for them!"

But do multitudes join me? They do not. Their praises for the mouse tribe are reserved solely for one, Mickey Mouse, probably the most popular star that the movies have produced. Does Mickey Mouse help the farmer? Not a bit. Does he help to diminish the wheat surplus? Of course not. Yet he is the world's most popular mouse; millions in all lands have laughed at him and loved him. Forgetting the field mouse, who carries the burden of our farm structure on his back, humanity reserves its praises for Mickey Mouse. Why?


WHOOPEE! I MADE IT!

Permission Walt Disney Studios

The answer is obvious. Mickey Mouse departs happily from all mouse-like sanity; he ignores the ordinary and does the extraordinary. Has a fierce creature snatched Minnie Mouse and dashed off with her to an enchanted castle? Then off goes Mickey to the rescue. He leaps over rivers; at a jump he clears oceans, scales mountains, climbs walls, bursts doors open and achieves his objective. And through it all he maintains his poise, he holds his attitude. There is something magnificent, something sublime about his disregard of all obstacles. Nothing daunts him; no dangers stop him. He is a grand fellow, a very Roosevelt for action, bearding the fierce Congressman in his den, hunting out the wicked banker, fighting for Beauty (and the taxpayer) in distress.

Aviation also has its Mickey Mouse, and its field mice, too—its industrious helpers. The comparison, I maintain, is not far-fetched. Consider these airline pilots, worthy fellows carrying the country's passengers, mail and express. What useful work they are doing, practically unnoticed and unsung! And the instructors in the schools, training the new crop; and the Army and Navy pilots, ready at the boom of a gun to leap into the air in our defense—grand and useful fellows, all of them. But unexciting. They are the field mice of aviation. Nobody pays much attention to them as they go calmly about their appointed aerial tasks. Good chaps, but there isn't a thrill in a planeload of them.

But what have we here? Who is this fellow in helmet and goggles and shiny new field boots, such as no field mouse ever wore—or field pilot either, for that matter? Who is this magnificent creature walking toward his long-distance plane followed by a brace of press agents, a dozen newspaper photographers and reporters and an assorted collection of humanity? You don't know him? Why, my poor friend, he is none other than the Mickey Mouse of the air.

There is no sense in what he is about to attempt. If there was, we wouldn't be watching him. He is about to load his family aboard a plane and fly across the Atlantic Ocean. Will he get across, or will he fall in en route? I don't know; that's why we're watching him, why we're interested. If he falls in, we shall be able to tell our friends that we saw him shortly before he fell in. If he gets over and becomes famous, we'll be able to boast that we knew him and looked at him when he was just another nut, and a loose one at that. Either way, *we* can't lose.

And who is this nice-looking man in the fur parka, or whatever you call it—all real explorers wear them? Why, dear me! That's Rear-Admiral Wren, the aerial Mickey Mouse of the Polar regions! Fancy seeing him here! He must be off for another expedition. Many a female heart will beat faster when he takes the air, chaperoned by at least two other pilots.

But look—! Who is this bewhiskered fellow trying to curl up inside an old sardine can? Ah, I didn't spot him at first—he was hiding behind that left whisker. It's Sir Jujube Pilkington, the Mickey Mouse of the Arctic Ocean, both above and below the surface. See how nimbly he whisks into and out of that old

(*Continued on page* 70)

EDITORIALS

Learning and Teaching a Lesson

IT may be history by now, but the incident of subduing the mutiny on the Dutch battleship *De Zeven Provincien* with one aerial bomb teaches a lesson which we should not permit—particularly some of our friends in the Navy—to be forgotten quickly. It will be recalled that half a dozen surface vessels and submarines chased the Dutch battleship over wide areas of the seas surrounding the Dutch East Indies and were unable to force the mutineering crew to surrender. Then the air force finally persuaded those in command to let them have a try at it. One neatly-aimed bomb did the trick. An excellent photograph was made of the bomb bursting on the superstructure of the battleship. We commend the picture to the close study of the officers in the Bureau of Operations, U. S. N. It's a good picture. It belongs in the textbooks.

***"The air arm, properly employed, is more humane than some other means of forcing an enemy to sue for peace."* —General Seely, chairman of the (British) Air League.**

Mr. Cord

MERGERS, realignments and changes of control are not achievements belonging exclusively to a period of prosperity. Recent weeks have produced two of major importance in the aviation field. One of these has resulted in the advancement of E. L. Cord to head of the Aviation Corporation. We can only go by Mr. Cord's record, and that record has been marked by signal successes.

The people of the industry will watch with close attention the service to which he will put his unique victory.

***"I appreciate the position of aviation in the scheme of national defense and will do my best to maintain that position."* —Wm. W. Howes, Second Assistant Postmaster General.**

Airman La Guardia

THERE comes a time in the lives of successful men when a job is done so well that there is no longer the occasion nor the necessity for continued action and effort along that particular line of activity. At the end of the war such a crisis came to Lawrence of Arabia—the man who was responsible for winning and holding great desert areas for the cause of England and her Allies in the World War. Upon the completion of this great work Colonel Lawrence ceased to be Colonel Lawrence and became Airman Shaw of the R. A. F.

Last March 4 a man left Washington after having spent the best years of his life serving the country as a member of the House of Representatives. He was no longer Congressman LaGuardia. He was again Citizen LaGuardia. During the war—a time when he was an active flier in Italy—it was Major LaGuardia. LaGuardia's departure from Washington was an occasion for general regret. A measure of that regret is exclusively a feeling of the American aviation industry. Not only in Washington but in the aviation affairs of his home state and of the nation, Major LaGuardia has been a consistent crusader in the right cause. On the occasion of his retirement from the House of Representatives, American aviation can pay a fitting tribute to Congressman LaGuardia by bestowing upon him permanently the new name—Airman LaGuardia.

***"When some airplane manufacturer announces that its engineering departments have developed the answer to the private owners' problem, there will be an unprecedented influx of business."* —R. A. Rawson, Field Manager, Master Builders Co., Washington, D. C.**

In the Emergency

AGAIN, in the recent banking emergency, aviation proved its worth and justified the existence of the American air transport system. It is a truth not to be forgotten nor neglected that the real value of worthwhile things is usually best demonstrated in time of emergency.

Both in the painful process of closing down of banks and in the more hopeful operation of reopening, American aviation played an important part in the speedy distribution of currency and papers of credit. This use of air transport went on all over the country in the recent bank holiday. It is to be regretted that the whole story—all of the individual incidents of advantages gained and financial embarrassment avoided as the result of quick dispatch of postal orders, money and banking paper by airplane—can never be completely told. On one night during the banking crisis T. W. A. sent four ships westward instead of its usual two sections. The additional service was required because of the aid which the airplane could render in such an emergency. And then as the banks began to open up, there was even greater need for quick dispatch of financial paper bearing upon clearances and credit.

The layman who believes that he can get along without aviation in normal times and is forced to use it in emergencies seldom forgets the service and is doubly impressed. American aviation is again to be congratulated for the demonstration which it put on.

***"Fourteen countries on the continent of Europe expend on a conservative reckoning rather more than four millions sterling (about $13,700,000) annually in direct subsidy to air transport lines."* —Mr. Handley Page, pioneer British aircraft constructor and airline operator.**

Aerial Vacation Travel

VACATION travel will offer greater possibilities than ever, this year. Many of the established airlines are providing newer and more comfortable equipment to their schedules. Innumerable mechanical and aerodynamic improvements have been combined to furnish the traveler with conveniences and speeds which were considered impractical but a few years ago.

Passenger cabins are better insulated against outside temperatures and noises; greater headroom is provided in the aisles and there is less cramping of seats; well-planned lighting arrangements make it easy for passengers to read at night without disturbing others who wish to doze off in thier reclining chairs.

(*Continued on page* 66)

Personairlities

By Caldwell

IT'S ABOUT TIME I dragged a bit of romance into these pages, so let us examine the peaceful hamlet of San Jacinto, California, as it was in 1924. What do we see but Joe Barrows, 21 years old and full of ambition, running a small flying school. He might have been there to this day, only he met a school teacher from Oregon. For thirty days the business suffered while Joe attended to his education. Then the young lady returned to Oregon, leaving Joe to think it over in San Jacinto. He thought it over for a week and moved the business to Oregon. The business was one Hisso Jenny and easy to move, anyhow.

Joe Barrows

In September, 1925, they were married. Young and hopeful, they started off on their honeymoon in the entire flying school—which is to say, the aforementioned Hisso Jenny. Thirty miles from the coast of Oregon, while they were flying along in the rain over well forested hills, with not even an open field within a radius of twenty miles, the school ceased operating. The aerial honeymooners sat down in a clump of scrub pines on the side of a ridge and went on from there afoot for two days in the rain, which refused to stop, even for honeymooners. That was just to show the young lady what she might expect for marrying a pilot. It was Nature's way of warning her. But she never paid any attention, thinking it all very romantic, I have no doubt. Instead of running off with a chiropodist, who at least could have fixed up her tired, aching feet, she forgave not only Joe but the Hisso Jenny, and has been walking back from forced landings for the past eight years. It would take more than a Jenny to haul the Barrows family today, for there's a girl of six, who has been flying since she was six weeks old, and a boy of five who, I believe, started even younger. They haven't gone solo yet, but both feel that they're ready any time.

Joe Barrows was born in San Bernardino, Calif., Sept. 14, 1903, and has been interested in aviation since the age of 14, when he helped Swede Meyerhoffer and got his first ride. At 15 he built a glider that worked fairly well when towed. During 1919 and 1920 he took flying instruction with Walt Hawkins at the Mercury Aviation School, Los Angeles, and then went back to engineering school for a year, flew during 1922 and '23 on a Jenny, barnstorming in California, and then sold his plane to buy a fishing boat. (I wrote *fishing* boat, not flying boat.) He did commercial fishing for six months, had a collision at night, fell off the boat while it was twenty miles at sea, and then went back to flying, figuring that flying was safer. The way Joe fished, I believe flying was safer, at that. When he wasn't falling overboard or colliding with some other boat, he was catching himself on his own hook. And, as we've seen, he no sooner started flying again than he got hooked anyhow, and ended among the scrub pines, nursing bottles, diapers, and all the rest of it, which is sad, but nothing can be done about it.

Well, he settled down at Crescent City, Calif., and ran an air taxi, taking hunters around for a year or so, and then went to San Diego to fly for Ryan Airlines, as a beer hauler in Mexico, in 1927. He was in charge of a fleet of planes that carried beer from the brewery at Mexicali to the thirsty at Tia Juana, thus averting disaster. Much of the road between those towns had been washed out in a cloudburst, so Joe went to the rescue of the perishing with a fleet of three Hisso Jennys and a Douglas Cloudster. It was the noblest work those ships ever did. Joe received the Grand Medal of the Frothblowers Association, awarded for noteworthy and meritorious service in the face of the enemy, drought.

He next rushed to the assistance of the United States Department of Agriculture and ran the Forest Patrol for Northern California during 1928 and '29, also doing aerial survey work for the department. In that year was born the idea that developed into Pacific International Airways of Alaska. With Edward Lowe, the original owner of the L. W. F. Company during the war, and Mrs. Lowe as passengers, Joe started from Buffalo for Alaska in a Fleetster. En route they heard of the Burke survey party being lost in the Yukon, so offered their services, together with a Fairchild that accompanied them. The Fairchild cracked up while landing on a frozen lake at Telegraph Creek, B. C., and Joe and the Fleetster landed and were taxying to the wreck when they went over a thin patch of ice, crashed through, and were marooned for six weeks until they had salvaged the Fleetster, which was not damaged by its immersion.

From 1929 on, Joe Barrows was vice-president and general manager of Pacific International Airways, flying mail down the Yukon and Kuskokwin rivers, flying freight to the mines and carrying passengers and doing emergency work throughout Alaska. Last October this line was purchased by Pan American Airways, who also bought the Alaskan Airways, formerly owned by American Airways. Consolidating these lines left Joe with nothing to manage except the two young Barrows. So after taking charge of the delivery by air of three Fairchild planes to Alaska, he returned to New York, attached to the engineering division of Pan American Airways and assigned to study the Alaskan operations. No one is better fitted for the job.

Last fall I had a long talk with Joe about flying in cold countries, from which I gather that if the Russians ever decided to take Alaska our own Army Air Corps would find themselves in the peculiar and embarrassing position of having pilots and mechanics who knew little about Alaskan conditions and airplanes that couldn't operate efficiently in Arctic weather without many changes. The present equipment would require: cowling changes, including shutters; oil and water lines properly lagged, heating of oils and engines before starting and proper equipment to do it with, skis for adaptation to universal snow conditions, emergency outfits for the personnel and emergency mechanical outfits, bases with gas and supplies, because gas is now available only in limited quantities. It would seem sensible to base a couple of Air Corps squadrons in Alaska for the valuable experience they would gain—an experience that some day may come in very handy.

JAMES B. LA MONT, superintendent of ship maintenance for Northwest Airways, Inc., started in aviation when the world thought that all aviators were mad; and he's still in aviation in these strange days when all of the world undoubtedly is twice as nutty as aviators ever were. If it isn't, how else do you explain Huey Long, Adolph Hitler the German dialect comedian, and the high cost of prize dachshunds—not to mention Atlantic hops for no rewards? For that matter, how do you explain first flight air mail envelope collectors who send me an average of a hundred of the confounded things each month to sign, whether I ever carried them or not? And what reasonable explanation has ever been advanced for Elks' parades, six-day bicycle races, Dick Blythe, dance marathons or half the movies produced about aviation? And in a sane world would there be autograph collectors, radio crooners, Burns and Allen, Radio City Music Hall, lap dogs, and three-decker sandwiches?

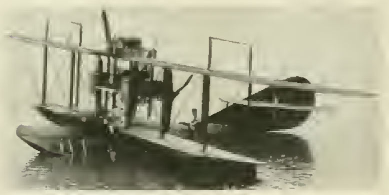
J. B. La Mont

Well, we won't labor the point. All I'm getting at is that Jim La Mont is an old timer who started in the aviation business when only pilots and the inmates of asylums were officially recognized as being insane, whereas today not one in ten of us in *any* line of endeavor could pass a psychiatrist without his reaching for a strait-jacket and shouting for the attendants. This old maintenance man started out to be a steamboat captain after being educated at Penn Yan Academy and Keuka College in New York State, though the names do sound as though those schools were in China. He aimed to voyage all over the world, but he started on Lake Keuka, rose to a captaincy with the Keuka Navigation Co., and then, before he could escape to sea, he met Glenn H. Curtiss. In 1908 he left steamboating to build motorcycles for Curtiss, and a year later found himself helping that pioneer to build airplanes. Thus was ruined one perfectly good captain who might have in time commanded the *Leviathan* or at least a Staten Island ferry boat.

After months of experiment the first Curtiss pusher, the famous *June Bug*, was completed, powered with a four-cylinder 35-h.p. motor, which today is in the Smithsonian Institution in Washington, right next to the spot reserved for Senator Bingham as soon as we get him stuffed and mounted on a beer keg. The *June Bug* that La Mont had helped to build was followed by the series of Curtiss pushers that made history in the old days and also made the Wright brothers very mad indeed. Even in 1908 aviation seemed crowded; there were always more airplanes than customers, more pilots than airplanes, and more semi-pilots than pilots. This still holds good.

Lincoln Beachey ordered a Curtiss plane in 1913. Jim La Mont supervised the building and testing of it; then it was crated and shipped to San Diego where Beachey performed the first loop in America—Pegoud already had looped in France. La Mont looked after the plane for Beachey until the day when that great pilot fell to his death in the wreckage of a specially designed monoplane that broke up in the air.

In 1914 La Mont returned to Hammondsport to supervise the building of the first plane designed to cross the Atlantic without the assistance of Admiral Byrd and his press agents. Lacking these essentials, the old *America*, as it was called, never got anywhere. It was a flying boat with three motors and a 76-foot wing spread. Later it was sold to Russia with fifty others just as bad, adding considerably to the troubles of that unfortunate country, and eventually leading to the revolution. La Mont accompanied the shipment to Russia, assembled the planes and then came home, leaving a group of startled Russians stroking their beards and staring doubtfully. Even Rasputin was puzzled.


The Curtiss "America" of 1914

It was in 1914 that Ruth Law bought a Curtiss pusher which La Mont shipped to Daytona Beach and assembled, accompanying her thereafter for six years during which she used the same ship and engine, flying in every section of the United States and making flights in Java, Honolulu and Japan. When she retired from aviation in 1921, Jim La Mont entered the U. S. air mail service as general shop foreman at Maywood, Ill. There he rebuilt D.H.'s and serviced ships until 1928 when the mail was turned over to private contractors. Since then he has been with Northwest Airways as superintendent of maintenance. He is a member of the Pioneers of American Aviation, restricted to those who were making a living out of aviation in 1916 and still are doing so, even in 1933. This last, I might add, I consider the more difficult feat of the two.

JAMES P. MURRAY, Washington, D. C., representative of the Boeing companies and vice president of the Boeing Airplane Company, was born in Connecticut and lived all over New England in his youth. After high school and collegiate days he turned school teacher and taught physics, mathematics and Latin at Hackensack, N. J. Imagine Latin in Hackensack!

He tried to get into the American Army as a flier during the War, found it overcrowded, so joined the R. F. C. and learned to fly in Canada and England, where he was an instructor. He brought down an enemy plane at the front. After the Armistice Murray started flying mail with the Army of Occupation from Folkestone, England, to Cologne, Germany — his first throw at a job that was to become his career.

James P. Murray

In 1920 he got back to his schoolroom at Hackensack, but the flying bug was in him. The Post Office Department needed pilots, so Jimmy, after demonstrating his capabilities at Washington, flew that tough stretch of country between Cleveland and New York.

At various times he flew the mail over the present transcontinental route on all sections from New York to Salt Lake City. He was one of the three pilots to fly that first trip with the transcontinental air mail back in September, 1920, making the flight from Chicago to Salt Lake. Then he was posted to Cheyenne and for eight years flew east and west. The *Congressional Record* credits Jimmy with more air mail hours, when the Government discontinued operation of the air mail, than any flier in the service.

When the Boeing companies wished a Washington representative to assist George P. Tidmarsh, Murray was offered the place and took it, making his last air mail flight in August, 1928, and now he is eastern representative of the companies and handles many matters for United Aircraft & Transport subsidiaries as well.

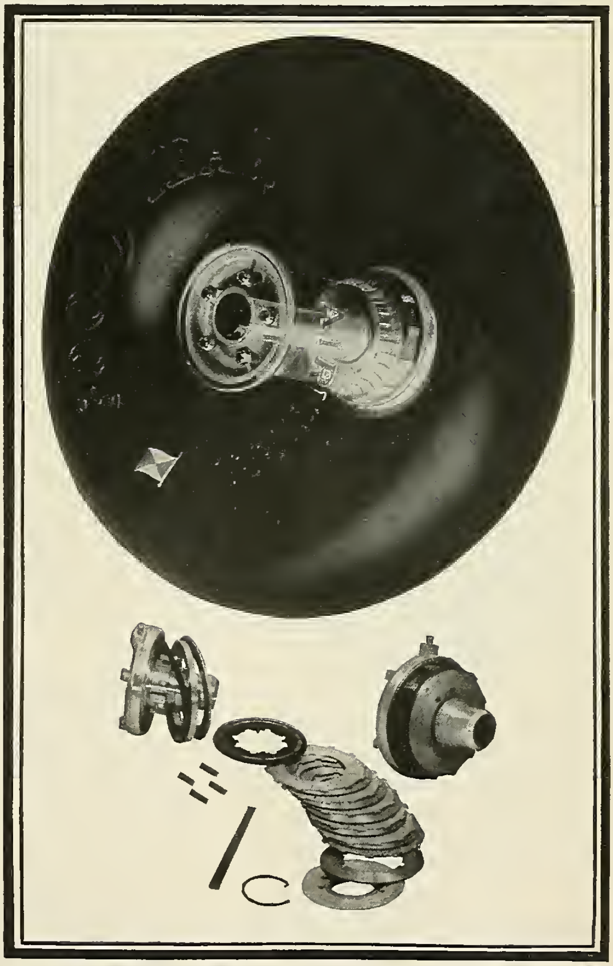
Murray has shown his capacity by dealing successfully with the Post Office, Commerce, War, Navy and State departments and even in the field of international diplomacy. He is getting to be as much of a Washington institution as the U. S. Senate—and is better liked.

Say, aren't you all feeling a lot more hopeful about Washington these days? We have a Leader there at last. Three rousing cheers and all support for our grand President. Boys, you can put your six dollars back in the bank now.

First came the AIRWHEEL

Then came the internal expanding AIRWHEEL BRAKE

NOW comes the FIRST HYDRAULIC BRAKE originated for Airplanes



HERE is a hydraulic brake as definitely built for airplane service as that first great super-soft tire which Goodyear named "Airwheel."

It applies a totally new principle to deceleration — not just a brake design borrowed from the motor car.

Instead of brake bands and drums, it uses the metal disc clutch principle which means —

- 400% more braking area than a comparable size band type brake provides
- 95% of the power applied to the brake pedal delivered to the brake unit
- Smoothness—reserve power—non-fading—instantaneous release at all times
- Far better heat dissipation — no overheating
- Operation with approximately 25% of the oil pressure required for hydraulically operated band brakes

This new Goodyear brake unit consists of alternate discs of bronze and steel — long-wearing and easy to replace. The unit compares favorably in weight with other type brakes — and is in line on price. It simplifies the design of new ships — and can be easily installed on ships now equipped with any other type of brake.

For complete data and prices write to Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

THE GREATEST NAME IN RUBBER

GOODYEAR

WHEN YOU BUY A NEW SHIP SPECIFY THE NEW GOODYEAR BRAKE

• AIRLINES and AIR TRAVEL •

Airline Safety Is Increased

AMERICAN-OPERATED scheduled airlines flew 4,377,425 miles for each fatal accident occurring during the last six months of 1932, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, announced last month. Passenger miles flown per passenger fatality were 9,113,672.

The semi-annual report by the Aeronautics Branch on accidents in scheduled air transportation showed that there were 48 accidents in 26,264,553 miles of flying by scheduled air transport operators during the period from July to December, 1932. Miles flown per accident were 547,178. Only six accidents involved passenger, pilot or aircraft crew fatalities. Miles flown per accident in the latter half of 1931 were 418,386.

Causes of the 48 accidents occurring during the last half of 1932 were divided as follows: Personnel errors, 15.95 per cent; power plant failures, 23.41 per cent; airplane failures, 24.47 per cent; miscellaneous, 34.04 per cent. In 2.13 per cent of the accidents the causes were undetermined or doubtful.

New Route Added to Express System

LESS THAN 20½ hours' flying time was announced last month by the Railway Express Agency Air Division offices as the permanent schedule for eastbound air express operation between Billings, Mont., and Newark Airport, N. J., a distance of 1,972 miles. The air service of the Express Agency has just been increased by a 400-mile extension of the Northwest Airways, Inc., from Bismarck-Mandan, N. D., to Billings, operation on which became effective March 3.

Bowen Adds to Dallas-Chicago Service

TWO NEW SCHEDULES were inaugurated by the Bowen Air Lines between Dallas, Tex., and Chicago, Ill., on March 1. This service will make three Bowen schedules daily between the two cities. Planes leaving Dallas at 8:30 a.m. will arrive in Chicago at 3:45 p.m., stopping at Tulsa and Kansas City en route. The planes leaving Dallas at 2 p.m. will arrive in Chicago at 8:45 p.m., making connections with the overnight planes to New York.

W. E. Rowens, Jr., has been made traffic representative for the company at Dallas.

Reed Airlines' Schedules Changed

SCHEDULES of Reed Airlines were revised March 1, when another daily round trip between Oklahoma City and Wichita Falls, Tex., was added, J. Reed, president, has announced. The new schedule calls for planes to leave Oklahoma City at 11:45 a.m. and 5 p.m., reaching Lawton, Okla., forty-five minutes later and Wichita Falls, Tex., in the next half-hour. Planes will leave Wichita Falls at 8 a.m. and 3 p.m.

Milwaukee-Detroit Mail Route Started

AIR MAIL SERVICE across Lake Michigan was inaugurated March 2, with the Kohler Aviation Corp., Milwaukee, Wis., awarded the air mail carrying contract. Planes on the new schedule make a stop at Grand Rapids before arriving at Detroit. Four daily flights, two each way between Milwaukee and Detroit, are called for in the initial schedule. The new service is an extension of the Twin Cities-Milwaukee route operated by Northwest Airways, Inc., according to postal officials.

New York Airlines Terminal Opened

A DOWNTOWN AIRLINE TERMINAL has been opened in New York by Postal Telegraph at Canal and Hudson streets, where buses of all airlines serving New York will pick up last-minute passengers before going through the Holland Tunnel to the Newark Airport. This waiting room will be outfitted with all conveniences for passengers and will also become an air express concentration point for New York over the General Air Express system.

Changes in Rapid Air Transport

OFFICERS elected at a recent meeting of stockholders of Rapid Air Transport include the following: President, S. R. Halley; executive vice president, Paul D. Selby; secretary, Hird Stryker; directors, A. Klopp and T. M. Bailey. On March 1 the general offices of the company were moved to the Municipal Airport, Omaha, Neb, and the home traffic office to the Paxton Hotel, that city.

On March 5 a new shuttle flight between Kansas City and Omaha was opened in addition to the Omaha-St. Louis schedule. A Lockheed Vega plane now makes the flight between Omaha and St. Louis in a little over three hours. The line recently joined the Railway Express Agency Air Division.

Airline to South America Planned

AN AIRLINE extending 6000 miles from San Diego, Calif., to Brazil is reported to be planned by former President Pascual Ortiz Rubio of Mexico. The line would be 3000 miles shorter than the present travel route, it is stated.

Browne Forms Alaskan Airline

NAT C. BROWNE, who attempted a trans-Pacific flight last year, has organized an air transport company at Fairbanks, Alaska.

Planes Figure in Emergencies

AIRPLANES played an important role in the emergency caused by the earthquakes of Southern California last month. United Air Lines planes carried officials, relief investigators, photographers, newspaper men and relatives of stricken families to and from the quake area and also rushed news pictures to the metropolitan papers and theaters of the Midwest and East. Planes flying between San Francisco and Los Angeles were filled with representatives of papers and photo syndicates. The morning after the earthquakes, a special transport was dispatched from San Francisco to Los Angeles, carrying Governor James Rolph, relief association officials, cameramen and relatives of families affected by the disaster. United's planes from Los Angeles to the East carried motion picture newsreels and newspaper photographs to Chicago, Cleveland, New York and Boston. A United passenger was the official representative of Los Angeles flying to Washington to seek the aid of the Reconstruction Finance Corp.

The earthquake, combined with the end of the national bank holiday, resulted in a record shipment of air mail on the coast-to-coast service of Transcontinental & Western Air, March 13. The regular mail flight left Los Angeles with 1,681 pounds of mail, about evenly divided between bank clearings, being rushed to New York at the end of the first day of normal banking, and letters from survivors of the earthquake, assuring relatives and friends in the East of their safety. Leaving Los Angeles Monday night, the checks and drafts were presented for clearing in New York on Wednesday morning.

Radio Assists Airway Advertising

AN UNUSUAL METHOD of combining radio and an airplane in advertising an airline has been developed by Northwest Airways and Radio Station KFYR of Bismarck, N. D. As the 11:10 a. m. six-passenger Hamilton plane of the airline passes over the city on its daily run, the sound of the 550-horsepower Hornet engine is picked up through a special microphone arrangement and broadcast. The sound effect is used in connection with the airline's advertising schedule over KFYR.

Second Stinson to Be Used by Airline

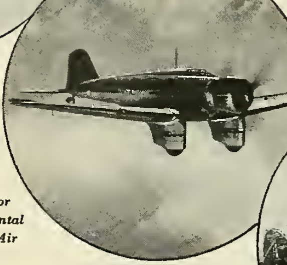
SUCCESS of the new Iloilo-Negros Air Express, operating between Iloilo and Manila in the Philippines, has prompted the organization to add a second Stinson ship to its equipment. The order was placed March 15.

(Continued on following page)

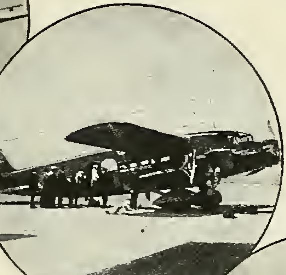
Radio Telephone *equipped* ...*factory installed!*

Boeing for United Air Lines

Condor for American Airways



Northrop for Transcontinental & Western Air



Stinson for American Airways

Aircraft Development Co.

Radio telephone is no longer *extra* equipment on transport planes. Leading manufacturers now make provision for radio telephone in their planes. Western Electric 2-way communication apparatus — factory installed just like motors and instruments—has been selected because of its proven reliability.

In these new planes, the radio units are integral parts—all located for correct distribution of weight, ease of maintenance and efficiency of operation when in service. Installation costs also are reduced.

Western Electric Radio Telephone is standard equipment on over 90% of the air mail routes of the country. For full details of apparatus for transport planes, private planes or airports — write to Western Electric Company, Department 279 AD, 195 Broadway, New York, N. Y.

All new transports built by the companies listed below are designed for Western Electric Radio Telephone.

Aircraft Development Co.
Boeing Airplane Co.
Curtiss-Wright Airplane Co.
Douglas Aircraft Corp.
General Aviation Corp.
Northrop Corp.
Stinson Aircraft Corp.

Western Electric*

Aviation Communication Systems

**Northern Electric in Canada*

MADE BY THE MAKERS
OF BELL TELEPHONES

Loading mail and baggage into two of the three compartments in the bottom of the new Curtiss-Wright Condor of Eastern Air transport

(Continued from preceding page)

Airways' Southern Offices to Be Moved

SOUTHERN DIVISION OFFICES of the American Airways, which have been located at Love Field, Dallas, Tex., will be moved to Fort Worth in the near future, according to an announcement made by L. D. Seymour, American Airways president. This change in location will not affect the service in Dallas but will involve the removal of executives, operations and maintenance personnel from Dallas to Fort Worth. Ground is to be broken April 1 for a $150,000 southern headquarters building.

Overnight service from Dallas to Cleveland, Ohio, has been inaugurated by the company. The service gives an uninterrupted passenger and mail service from Los Angeles to New York, via Dallas and Cleveland.

Midwest Transport Company Organized

THE MISSISSIPPI VALLEY Air Transport Company, Inc., has been organized at La Crosse, Wis., to operate between La Crosse and Minneapolis, Minn. The company is capitalized for $25,000, and Edward M. Maxwell is president and general manager of the firm. Other officers include R. T. Orr, vice president, and Joan Maxwell, secretary and treasurer. Frank Muth is chief pilot. The company has purchased the hangar and planes previously owned by Earl Richmond. Its operating base is the Salzer municipal airport at La Crosse. At first the line will engage only in flying freight between the two cities.

Chrysler Regularly Uses Air Express

SHIPMENT of replacement parts for Chrysler, Dodge, Plymouth, De Soto and Fargo products is to be made regularly by General Air Express, according to a recent announcement by J. L. Kenyon, vice president of Chrysler Motors Parts Corp. Postal Telegraph Co. will arrange for ground handling of the merchandise, offering a special pick-up service and immediate individual delivery to the various dealers.

Fort Worth Office Opened by United

A BRANCH OFFICE of United Air Lines has been opened in Fort Worth, Tex., with M. H. Hagberg in charge. Mr. Hagberg was transferred from the Dallas office. Since the line was opened in 1926 Fort Worth business has been handled from the district office in Dallas.

United Ships Stop at Mills Field

BECOMING the first airline to provide a direct non-stop flight between San Francisco and Los Angeles, United Air Lines has made San Francisco Municipal Airport, Mills Field, a regular port of call on its Pacific Coast mail, passenger and express airway. It is now possible to go from downtown San Francisco to the heart of Los Angeles in three and a half hours, including time required for bus transportation at both terminals. The use of the San Francisco Municipal Airport eliminates the necessity of crossing San Francisco Bay to reach the airport on the east side, formerly used solely. Service from Seattle, Tacoma and Portland to downtown San Francisco also was speeded up thirty minutes by United's move.

American Airways Officials Named

R. C. MARSHALL, vice president of the eastern division of American Airways, has announced the following appointments: E. F. Ward, general superintendent in charge of all operations, with offices in Cleveland; J. L. Ruden, superintendent of maintenance, with headquarters at Cleveland; C. A. Rheinstrom, divisional traffic manager, with headquarters at Robertson, Mo. H. D. Ingalls will have charge of the base repair depots, with headquarters at Robertson, Mo. The Pontiac, Mich., repair depot will be under the management of B. C. Hawkins.

Eastern Air Inaugurates New Schedules

REORGANIZED SCHEDULES of Eastern Air Transport, including the former Ludington services, were put into effect last month. Departure times of planes from Newark Airport on routes to Miami, Fla., and Atlanta, Ga., have been retarded forty minutes, as has the departure time of the plane between Charlotte, N. C., and Augusta, Ga. The afternoon plane from Newark to Richmond, Va., now leaves its northern terminus at 3:40 instead of 4 o'clock.

The first of nine new Condor transport planes was delivered March 25 to the airline by Curtiss-Wright.

United Adds Midwestern Route

UNITED AIR LINES is now operating the air mail, passenger and express route from Omaha to Kansas City formerly operated by American Airways, and the company has also altered its Pacific coast service to include Sacramento as a regular stop on the Seattle-San Diego airway.

This schedule provides connections at Omaha west to Pacific coast cities and north to points on the Watertown route and to St. Paul and Minneapolis, and at Kansas City to the Southwest. It gives Kansas City service by two divisions of United Air Lines, as the B. A. T. division is operating the new route while the N. A. T. division operates the Chicago - Kansas City - Southwest schedules. It also adds another point, St. Joseph, to United's network.

On the Pacific coast service, Sacramento is given its first direct air service to the Pacific Northwest, and service is improved from eastern points to Medford, Ore., by the daily connection of United Air Lines' westbound coast-to-coast transport.

Varney Increases Pacific Coast Trips

DISCARDING winter schedules, Varney Speed Lines on March 1 resumed four round-trip schedules per day between Los Angeles and San Francisco.

Miami-Bimini Airline Inaugurated

PASSENGER OPERATIONS were started recently by the Inter-Island Air Ferries between Miami, Fla., and Bimini, with William P. Lawless, E. M. Stafford and C. M. Pickup as pilots. Ships fly daily to Bimini at 10 a. m., returning at 5 p. m. Twin-motored Sikorsky amphibions are used.

Varney Official Appointed

D. G. MARSHALL, formerly stationed at the northern terminal of Varney Speed Lines, has been transferred to United Airport, Burbank, Calif., where he is district manager for the lines, according to a recent announcement.

"IS IT TRUSTWORTHY?"

. . THE FIRST QUESTION OF THOSE WHO FLY

They may not actually voice this question, but it's in the mind. With some it may be the mere shadow of a doubt—with others it is so strong that they've never ventured aloft, though fascinated by the desire to fly. "Is the plane trustworthy?" Bellanca always, under all circumstances, replies, "Yes, it's a safe ship — its long record of historical and commercial achievement proves that!" No splitting of hairs — no ifs, ands or buts — Bellanca security goes hand-in-hand with its strength, its flying qualities, its reliability and other well-known Bellanca features. What is more, Bellanca gives all the speed that can be given with safety.

BELLANCA AIRCRAFT CORPORATION
New Castle, Delaware
Bellanca Aircraft of Canada, Ltd., Montreal

The Bellanca line includes the 12-15 place AIRBUS, the 6 place SKYROCKET and the standard 6 place PACEMAKER. In every phase of performance—in every detail of construction—each Bellanca airplane is

Built **AS ONLY** BELLANCA **CAN BUILD**

Wedell-Williams Airline to Open

A PASSENGER SERVICE between New Orleans, La., and Laredo, Tex., via Houston and San Antonio, is scheduled to be inaugurated soon by the Wedell-Williams Air Service of Patterson and New Orleans, La. James R. Wedell recently made an inspection tour of the proposed route.

Shorter Route to Denver Inaugurated

THE SOUTHWEST AIRWAYS, which have been operating between Tulsa, Okla., and Wichita, Kans., have extended their line to Salina, Kans., in order to make direct connection with the U. S. Airways to Denver. Heretofore the shortest route to Denver from Tulsa has been through Amarillo, Tex., but the new line makes possible a saving of more than two hours.

Cleveland Ticket Office Men Elect

D. W. SWAN, division traffic manager for Pennsylvania Air Lines, has been named president for 1933 of the Cleveland (Ohio) Airport Ticket Office Association. B. B. Gragg, retiring president of the association and division traffic agent for United Air Lines, was named vice president, and Don B. Wilson, Cleveland traffic representative for Transamerican Air Lines Corp., division of American Airways, secretary-treasurer.

Vice President of United Chosen

ELECTION of W. A. Patterson to the position of vice president of United Air Lines, with headquarters at the general offices in Chicago, has been announced by President P. G. Johnson. The advancement comes after nearly four years of service as assistant to Mr. Johnson, Mr. Patterson having entered the company in that capacity in April, 1929.

Japan-Philippines Line Considered

HAROLD M. BIXBY, former president of the St. Louis (Mo.) Chamber of Commerce and one of the backers of Col. Charles A. Lindbergh's trans-Atlantic flight, has left for China. He will begin the survey of a proposed air route between Japan and the Philippine Islands via Shanghai and expects to spend six months in the Orient, working out the details of the project. It is reported that the plan has the support of a leading American airline.

Air Mail Routed Through St. Louis

A RECENT CHANGE in schedules of Transcontinental & Western Air causes mail from Florida and southeastern cities and from South America to be routed through St. Louis to the Southwest and the Pacific Coast. The former departure from St. Louis at 7:30 a.m. is postponed to 8:15 a.m. to make a connection with planes of American Airways from the Southeast. The mail, passengers and express arrive in Los Angeles at 10:23 p.m. Mail from St. Louis to San Francisco also is sent over this route.

Ticket-Selling Facilities Enlarged

MEMBERS OF the Stinson Air Cab Operators Association now may sell transportation on the Transcontinental & Western Air lines. It is reported that sixty per cent of the membership is located in communities not touched by the airlines, and the extension of the ticket service will be of value to passengers in those communities.

Airways Executive Changes Announced

A REORGANIZATION of the executive staff of the Northwest Airways, Inc., operators of an air mail line from Chicago to the Twin Cities, via Milwaukee, has been announced. Col. L. H. Britten, formerly vice president and general manager, has been appointed executive vice president, with headquarters at Washington, D. C.

Croil Hunter, traffic manager, also will assume the duties of general manager. F. W. Whittemore has been appointed chief pilot and acting operations manager at the company's main office at St. Paul. He replaces W. R. Bullock, St. Paul, formerly operations manager, who resigned. E. I. Wyatt, formerly assistant treasurer, has been appointed treasurer. R. C. Lilly remains as president.

In Milwaukee, E. B. Mulick, in charge for the airline at the county airport, has resigned, and his place is taken by J. G. Cowling, formerly with the Hamilton Metalplane Co. Stuart Auer remains as division traffic manager in Milwaukee.

Southwestern Airway Lighted

THE AIRWAY between Amarillo, Tex., and Tulsa, Okla., was equipped with lights recently. The line has twenty-seven revolving beacons and five fully lighted emergency landing fields. All lights are of the newest type. Work was started on the project August 18.

Special Service to Chicago Planned

AIRLINES serving Chicago will fly additional schedules to that city this summer, giving adequate passenger facilities for visitors to A Century of Progress, according to exposition officials. United Air Lines plans to operate a schedule every odd hour between Chicago and New York and also will supplement its present schedules between Chicago and the Pacific Coast and between Chicago and Dallas, Tex.

California Cities Added to Schedules

BEAR AIRLINE'S planes operating between the San Francisco Bay Airdrome and Stockton, Calif., now include Livermore, Tracy and Modesto as flag stops. The company has reported a reduction in passenger fares between the San Francisco Bay Airdrome and Stockton.

Texas Airline Extended

AIR TRANSPORT SERVICE from Dallas to Longview, Tex., has been inaugurated by the Texas Airways of Dallas. Planes leave Dallas at 10:30 a.m. and arrive at Longview at 11:50 a.m. This service is an extension of the line from Dallas to Tyler and Henderson. The new service links Dallas with all important cities and towns in the East Texas oil field. W. T. Pittman of Dallas is manager of the line.

Air Marking Akron for Night Flying

AKRON, OHIO, may be identified from the air at night by the two neon electric Y's atop the new Y.M.C.A. building. The building, which was recently completed at a cost of over a million dollars, is surmounted by two Y's, one facing east, the other west. They are each six feet, six inches high, and are never turned off. They cost three dollars a month to operate, each using 200 watts.

New England Line Prepares for Season

IN PREPARATION for early operations, three Fairchild 71 cabin planes recently acquired by Maine Air Transport have been equipped with pontoons. Four of the seven seaplanes operated by the company in the New England states will maintain a daily schedule between New Bedford and Nantucket, Mass. It is expected that five trips per day will be made over the route.

Officials of the airline are: Armar Archbold, president; Cummins Catherwood, treasurer, and William Wincapaw, operations manager.

Pennsylvania Airlines Reduces Fares

A REDUCTION of ten per cent in round-trip fares between Washington, Pittsburgh, Akron and Cleveland has been announced by Pennsylvania Airlines, Inc., Pittsburgh, Pa.

Oakland Airport New TWA Base

TRANSCONTINENTAL & WESTERN AIR, INC., has moved its east San Francisco Bay base from the San Francisco Bay Airdrome in Alameda to Oakland Municipal Airport. Mail is handled on all departures and arrivals. James E. Scott has been named Eastbay traffic manager and has established offices at the Oakland airport.

Air-Rail Line to Denver Inaugurated

CONNECTING with the Missouri Pacific Railroad, the Braniff Airways of Tulsa, Okla., has announced a sixteen-hour air-rail passenger service between Tulsa and Denver, Colo. The new arrangements, as reported by W. Z. Fox, traffic manager, involve departure of a ship from the Tulsa port at 4:05 in the afternoon to connect with the Missouri Pacific train leaving Kansas City the same afternoon and reaching Denver at 8 o'clock the following morning.

These few words sum up the story of the Boeing 247! For this newest commercial model was not only engineered to the 1933 requirements of air transport operators, but was also *tailored* to provide "club car comfort" for an increasing and discriminating passenger traffic. ¶ In speed, operating economy, payload, strength and comfort the Boeing 247 is truly *"tomorrow's transport today"!* . . . Send for detailed specifications. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.

BOEING *has always built*
tomorrow's airplanes today!

• PRIVATE FLYING •

Private License Requires Fifty Hours

FIFTY HOURS of accredited solo flying time will be required of candidates for the grade of private pilot license instead of ten hours as heretofore, under the terms of an amendment to the Air Commerce Regulations announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The amendment, which was made effective March 1, also creates the grade of solo pilot and provides that all privileges heretofore enjoyed by private pilots now will be conferred upon students who have completed ten hours of solo flying and who pass the tests specified for solo pilots, except that such solo pilots will not be permitted to carry any person except a transport, limited commercial or private pilot. Holders of present private pilot's licenses will be permitted to fly on their present licenses until June 1, on or before which date it will be necessary for them to qualify for the new private pilot's license.

The grade of industrial pilot is abolished by the amendment, but licenses outstanding in this classification will be valid for the present.

A student permit will be issued in the ordinary manner, and at the end of ten solo hours of flying, the student will present himself to a Department of Commerce aeronautical inspector for theoretical and flight tests. If he passes these tests, he will be authorized to fly as a solo pilot.

Continuing with his flying instruction as a solo pilot, the aviator may choose to become an amateur pilot with private license or a professional pilot within the limited commercial grade, as the flying experience required is fifty hours in either case. As a private pilot, he will have to meet less difficult physical requirements, with yearly renewal, and the theoretical tests will be less stringent than those for commercial grades. As a limited commercial pilot, he will be required to comply with the physical standard for commercial pilots with semiannual renewal, as well as to accomplish a written examination consistent with the privilege of commercial passenger carrying. The flight tests for the private and limited commercial grades will be the same.

The Flying Roosevelt Family

MRS. FRANKLIN D. ROOSEVELT, reported to be the first President's wife to fly, used transport planes for traveling between New York and Washington, D. C., last month. Two of her sons also used airplanes last month in traveling to different sections of the country. Elliott Roosevelt made part of a trip to Arizona by special plane, and James Roosevelt accompanied Secretary of War George H. Dern on an air trip from Washington to Boston, Mass.

A trimotor transport was being equipped last month with a desk and comfortable seats for the use of Cabinet officials and Congressmen, it was reported. The plane also will be at the disposal of President Roosevelt.

Aeronautical Club Being Organized

SEVERAL PILOTS are forming an aviation group to be called "Albatross Club." Having for its purpose the advancement of aviation and the promotion of a fraternal spirit among pilots, mechanics and others connected with aviation, the group is to be a non-profit organization with a membership of both men and women. Edwin Sebovitz of 219-07 Jamaica Ave., Queens Village, L. I., N. Y., is in charge of information concerning the club.

Ninety-Nines Plan Activities in Meets

THE ANNUAL STATEWIDE MEETING of the California Ninety-Nines is planned to be held at Bakersfield, coincidental with the Bakersfield Air Meet on May 7. Members of the organization will attend a banquet the night preceding the meet and will also take part in the events.

Plans for a Ninety-Nines invitation all-women's race on May 30 from Floyd Bennett Field, Brooklyn, N. Y., to Valley Stream, L. I., N. Y., and return have been approved. Three cash prizes and a number of other awards will go to the winners.

The tentative date of July 3 has been set for the annual meeting of the Ninety-Nines national organization. The meeting will be held at Los Angeles, Calif., in conjunction with the National Air Races there.

Aviator Drops Food to Marooned Town

BREAD was dropped from a plane to his fellow townspeople by Floyd Bottorff of Cortland, Ind., recently, when a bakery truck was unable to pass through flood waters marooning the town.

Duluth Club Elects Officers

HOWARD D. BUSH has been re-elected president of the Duluth (Minn.) Aviation Club. Other officers include C. F. Timmerman and A. J. Pfaender, vice presidents; H. A. Lindbergh, secretary; E. J. Soukup, treasurer; John F. Duncan, Guilford Hartley, G. J. Barrett and Dr. Max R. Herrmann, members of the board of directors. A number of projects, including air shows, air marking and stimulation of use of the air mail, will be sponsored during the year.

Advertising Firm Operates Own Planes

SINCE July, 1930, when it purchased its first cabin plane, the advertising agency of Ehlinger & Higgs, Inc., of Tulsa and St. Louis, has caused its representatives to spend hundreds of hours in the air, traveling thousands of miles to carry on the work of serving clients in many widely separated points. By maintaining its own planes, it has constantly available transportation that is not limited to the schedules of the time table, nor are its agents hampered in traveling to points not accessible by regularly operated airlines.

According to Stanley J. Ehlinger, president of the company, over half the country is within six hours' flying time, and it is possible to cover the same territory that could be reached if a dozen offices in as many cities throughout the country were maintained.

By having planes available at both Tulsa and St. Louis offices, executives are able to leave on a moment's notice, and to be in a client's office, in many instances, in less time than if a branch office in a nearby city were being operated. Consolidating all operations within two offices, a large amount of detail and overhead is reduced.

By keeping a careful analysis of plane, engine, storage, miscellaneous, gasoline and oil expenses incidental to the operation of each plane, it was found that during 1932 one ship, a four-passenger cabin plane, traveled approximately 25,122 miles at a cost of 7.4 cents per mile or $6.49 per hour. By carefully kept records over a period of almost three years, the company knows what it will cost to make any trip by air.

Pioneer Group Seeks Wright Model B

THE EARLY BIRDS, pioneer fliers' organization, wishes to locate one of the Wright Model B biplanes such as were used for early exhibition flying. A number of members learned to fly this plane and for historical reasons desire to ascertain the location of a complete machine or any parts of it. Headquarters of the group is at 365 Savoy Plaza Hotel, New York, N. Y.

Caleb Bragg, pioneer flying boat pilot and sportsman, is now the Early Birds' president.

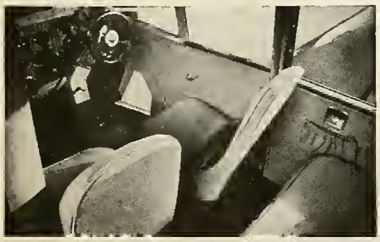
Wisconsin Club Is Formed

THE SUNSET FLYING CLUB has been organized in La Crosse, Wis., and expects to start operations April 1. The club plan provides each member with a share in the airplanes and equipment and enables him to fly at actual cost of operation of the airplane. Frank Muth and M. D. Stickler, local aviators, head the new group.

LIMOUSINE LUXURY IN THE AIR WITH AUTOGIRO SECURITY

Step through the wide door of the Pitcairn Cabin Autogiro! Your first impression is of roominess. Relax in the luxuriously upholstered seats and take off. You are first aware of remarkable visibility in all directions. You soon notice how quiet it is. Unusual noise insulation enables you to converse without strain. You become conscious of detail after detail of careful planning:—Perfect ventilation even with all windows closed; hot air heating; safety glass; comprehensive instrument equipment; simple and convenient control equipment with swing-over wheel for dual operation. All of the comforts and luxury of a fine limousine plus the unapproached security inherent in the Autogiro principle.

Write the company or the nearest representative listed below for full descriptive literature.



PITCAIRN AUTOGIRO COMPANY . . . PITCAIRN FIELD . . . WILLOW GROVE, PA.

Distributors and Dealers:—Garden Spot Motor Co., Prince and James Sts., Lancaster, Pa. . . . Giro Sales & Service, Inc., Roosevelt Field, N. Y. . . Giro Transport & Sales Co., Inc. 292 Madison Ave., New York, N. Y. . . . Harrisburg Autogiro Sales Co., 100 Telegraph Building, Harrisburg, Pa. . . . Jesse K. Fenno, Providence Airport, Seekonk, Mass. . . . New England Giro Company, 915 First Nat. Bank Bldg., Boston, Mass. . . . Pacific Giro Sales. Inc., Grand Central Air Terminal, Glendale, Calif. . . . Palwaukee Airport, Inc., 1116 Marquette Bldg., Chicago, Ill. . . . Pitcairn Aeronautical Corp., Pitcairn Field, Willow Grove, Pa. . . . Wings, Inc., Wings Airport, Blue Bell, Pa.

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AT THE AIRPORTS

Roosevelt Field Election

GEORGE W. ORR was re-elected president of Roosevelt Field, Inc., operators of Roosevelt Field, Mineola, L. I., N. Y., and Albert L. Smith was chosen chairman of the board of directors at an election of the company last month. Other officers named at the meeting include the following: Chairman of the executive committee, Graham B. Grosvenor; vice president, Harold Hathaway; treasurer, W. D. Guthrie, and secretary, A. C. Kennedy. Among the twenty new directors are four representatives of E. L. Cord, who recently gained control of the Aviation Corp., which is a stockholder in Roosevelt Field, Inc. These men are C. Coburn Darling, P. G. Kemp, L. L. Young and L. B. Manning.

Carthage, Mo., Receives Airport Gift

THE DIRECTORS of the Chamber of Commerce of Carthage, Mo., have accepted the gift of a 159-acre tract of land from Mrs. Edna Myers, to be used as an addition to the municipal airport. Forty acres of the tract have been in use in the airport for some time. The field is just south of the city limits, about 1½ miles from the business district. The only stipulation attached to the gift is that the city pay the donor $500 yearly for five years and $600 yearly thereafter until her death.

The Carthage Special Road District will lend men and equipment for levelling the ground and placing a covered-tile drainage ditch where it is needed at the airport. This work will be completed by late spring or early summer. Coincident with the signing of contracts for the building of a new municipally owned water storage tower, a lighting system for the airport was announced. The water tower will be about a half-mile from the field, 110 feet high, and an airplane beacon will be installed atop the tower. Eventually the remaining work of installing boundary lights will be done.

Boeing Field Employees Divide Work

JOB ROTATION and job sharing, to put more men to work, was started March 1 at the Boeing Airport, Seattle, Wash. The whole staff of employees was placed on a rotation basis through orders of the county commissioners. Each employee works two weeks at a time and takes two weeks' vacation.

Rhode Island Firm Changes Hands

WINGS, INC., the first operating company at the Rhode Island State Airport, was taken over last month by Benjamin Follett, Jr., and Melvin T. Holbrook, Jr., of West Warwick. Mr. Follett will be president and chief pilot, and Mr. Holbrook general manager and treasurer. Mr. Follett was organizer of the company, which was the first to break ground for a hangar at the field, when the airport was constructed at Hillsgrove, R. I., two years ago. Wings, Inc., will operate charter trips, using four planes it owns and others available.

Photography Company Opens at Airdrome

THE FIRM of Andrews and Waage has opened headquarters for aerial photography and aerial advertising services, as well as providing student instruction in flying, at the San Francisco Bay Airdrome. Jerry Andrews and Gilbert Waage are partners in the organization.

Kansas City Airport Annual Report

TOTALS of 31,608 transport passengers and 13,928 other air passengers were reported for 1932 as using the Municipal Airport of Kansas City, Mo. Landings and take-offs numbered 17,244 and 17,316, respectively, and mail carried amounted to about 407,824 pounds. A total of 151 aircraft was registered during the year at the airport, at which no major accidents or fatalities took place during the period.

Syracuse, N. Y., Rents Additional Land

MAYOR ROLLAND B. MARVIN of Syracuse, N. Y., has directed that the new auxiliary landing field which the city is leasing at Amboy be put into shape for use by aircraft. The common council, after a trip of inspection to the municipal airport, also at Amboy, gave its approval to the mayor's proposal to lease ninety-seven acres of land to the east of the Empire hangar. This will assure the airport of the north-and-south runway space which is essential if the port is to be given an A-1-A rating and continue as a transport plane landing point.

Inventions in Use at United Airport

HARVEY E. LAFAYETTE, Los Angeles inventor, has developed an electrically-timed parachute at United Airport which, descending like a bomb with its cargo carrier, opens at a pre-determined height above ground. Eliminating wind driftage, supplies may be dropped unerringly to any desired mark. Mr. Lafayette is associated with Bill Dodson, of United Aviation and Parachute Service.

United Air Lines has completed installation at United Airport of special wiring for the starting of transport engines at passenger-loading canopies. A new type of portable electric starter has been developed, similar in principle to an electric hand drill. The device eliminates the use of plane batteries for starting, conserving them for two-way radio-telephone communication.

Rhode Island Airport Bills Introduced

A BILL was introduced March 16 in the Rhode Island State Legislature, appropriating $10,000 for the purchase of materials for unemployment relief projects at the State Airport at Hillsgrove. While only $10,000 is appropriated under the bill, it is expected that from $10,000 to $15,000 will be paid by the State Unemployment Relief Commission to jobless men for work on the project. It is planned to employ between 100 and 150 jobless men for about sixty days to construct drainage ditches, clear stumps and level the ground on the uncompleted area of the field and build asphalt landing aprons and runways.

Introduced by Senator Harry A. Bodwell, chairman of the State Aviation Commission, another bill would allow the commission to reconvey or sell land condemned to create the airport, or to auction off parcels not needed for development of the field.

Skyproducts Opens New Service

ROBERT SHAPIRO, president of Skyproducts Co., and Gordon Hamilton, general manager of Eastern Aeronautical Corp., have announced a new form of aviation sales and service at Newark Airport, N. J. Airplane owners who store planes at the hangar of the companies may use all shop facilities in the hangar without cost. Licensed mechanics are on hand in this Approved Repair Station to give assistance if desired. Skyproducts Co. will continue its service in parts, accessories and supplies.

Mr. Hamilton has been associated with Eastern Aeronautical Corp. since the opening of the airport. Prior to that he was in charge of civilian mechanics at Miller Field. Robert Shapiro and his brother, Al, have been in the supply business since 1921 and were located at the old Army base at Port Newark. The later is secretary and treasurer of Skyproducts.

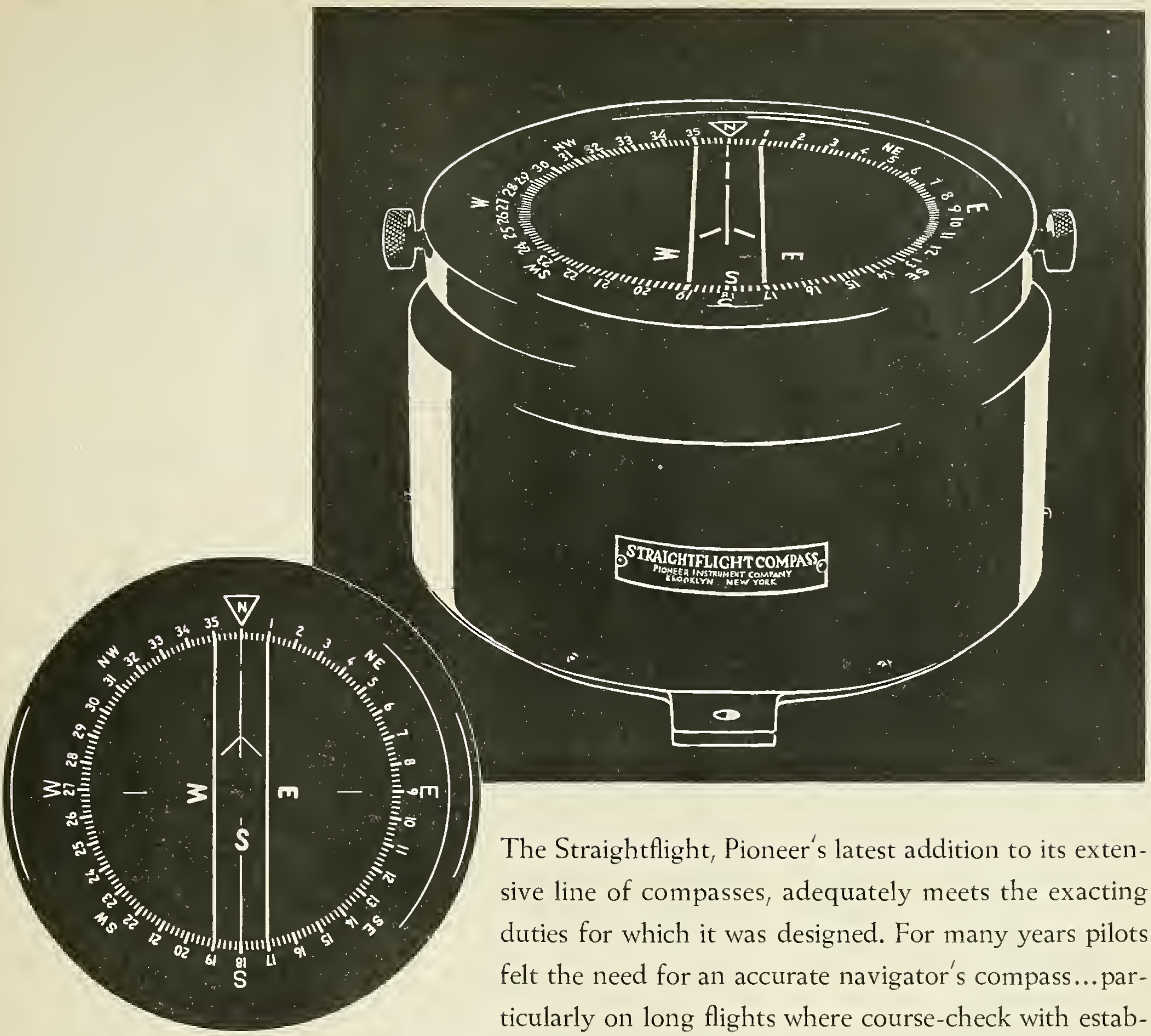
Charges Lowered at New Haven

REDUCTIONS of charges for hangar storage, mechanics' time and instruction and rental on Kitty Hawks were announced last month by The Viking Flying Boat Co. of New Haven Municipal Airport, Conn. The company also operates a charter service with Waco cabin planes, as well as makes short passenger flights and packs parachutes.

Races at Pennsylvania Airport

AN AIR RACE PROGRAM will be given at the Parker D. Cramer Airport, Clarion, Pa., May 30. About $500 in cash prizes will be distributed. R. Brinkley is in charge of pilots' applications blanks.

(Continued on following page)



The Straightflight, Pioneer's latest addition to its extensive line of compasses, adequately meets the exacting duties for which it was designed. For many years pilots felt the need for an accurate navigator's compass...particularly on long flights where course-check with established land marks was not possible. And now, with the current system of "flying solely by instruments," the Straightflight attains even a greater importance as a directional instrument. Combined with the usual Pioneer features, the Straightflight embodies individual qualities which effect the desired characteristics for an ideal navigation compass...steady card...long period...no overswing. These results are produced by maintaining a strong magnetic control over an extremely light and well-damped card. A spring suspension protects the card, pivot and jewel against damage by vertical vibration, and the new Pioneer anti-vibration mounting absorbs the horizontal vibrations which usually cause swirling of liquid and card oscillation. A large card, provided with parallel lines, makes it possible to take an accurate reading at a glance. The finest testimony to the Straightflight is exemplified in its approval by Army, Navy and transport pilots.

PIONEER INSTRUMENTS

PIONEER INSTRUMENT COMPANY INCORPORATED
BROOKLYN • NEW YORK • A SUBSIDIARY OF THE BENDIX AVIATION CORPORATION

(Continued from preceding page)

Dedication of Virginia Airport

AIR RACES, aerobatics and other contests, in addition to ceremonies in which state and city officials will participate, will mark the dedication of the Norfolk-Tidewater Airport at Norfolk, Va., on July 4, according to R. Brinkley, managing director of the program. Cups, trophies and over $500 in cash will be awarded to winners of various events.

Traveling Service Unit

SAN FRANCISCO BAY AIRDROME has a service unit consisting of an 800-gallon gasoline tank and a 160-gallon oil tank mounted on a Standard Oil motor truck. The truck also is provided with compressed air for tire inflation, a gear pump which works from the engine drive shaft, for pumping gasoline, and three fire extinguishers for emergency use.

Texas Field Is Opened

RICH FIELD, near Waco, Tex., was opened March 19. C. H. Green Jr., is instructor of the school at the field, and M. E. and J. C. Slaton are acting as business managers.

Beacon Dedicated for Airport Sponsor

A PLAQUE on the Merrill Beacon at Anchorage, Alaska, has been unveiled and named the Russell H. Merrill Memorial. The beacon was built in memory of the late Mr. Merrill, who was largely responsible for the Anchorage Airport.

Ogden, Utah, to Buy Airport

AIRPORT OGDEN must be purchased by Ogden, Utah, in 1933. The lease, which was made in 1928, calls for purchase on May 31, 1933, of the flying field from the Ogden Land Company. The port contains about 288 acres, of which 185 acres are suitable for flying field purposes. The city has spent $20,000 on the airport, and in addition, the Pacific Airways, Inc., has expended a considerable sum at the field.

Heath Official Named Airport Manager

CONRAD "DUKE" MULLER, who has been superintendent of the Heath Aircraft factory in Niles, Mich., since 1931, is now in charge of the Niles airport, following his appointment by the Niles City Council. Muller immediately resigned his position with the Heath factory to take over his new duties. Under his supervision hangars are being renovated and the grounds are being completely resurfaced and graded.

Officers Chosen at Wisconsin Field

N. J. HOLCOMB of Appleton, Wis., has been elected president of the Aeronautical Association at Whiting airport near Neenah, Wis. Elwyn West, Menasha, is vice president; Luther West, second vice president, and Frederick Stecker, Neenah, secretary-treasurer.

Texas Field Is Dedicated

ASHERTON, TEX., recently celebrated the dedication of its new airport. It is the only airport in Dimmit County.

Allegheny Lighting and Traffic Aids

LIGHTING and traffic control at the Allegheny County Airport, Pittsburgh, Pa., has been planned by engineers of the Westinghouse Electric and Manufacturing Co. It makes dispatching effective and quick as well as enhances the appearance of the field. Floodlighting also accentuates the architectural beauty of the administration building. A diagram of the floodlighting system planned for the airport appeared in the June, 1932, issue of AERO DIGEST.

The dispatching station is located in the control tower atop the administration building, where the operator may direct traffic and outline the airport for incoming planes. With this centralized control, all lighting equipment on the field is directed by the dispatcher in the observation room. There a control desk is equipped with a complete outline of the field, with pilot lamps marking the beacons, markers and signal lamps. A compass and wind indicator also aid the operator in directing planes.

The circuits are so arranged that each landing direction is indicated automatically by the rows of lights each side of the runway.

Company Takes Over Hangars at Camden

THE WALZ CORP. has taken over the hangar facilities at Central Airport, Camden, N. J. Student instruction as well as charter work will be handled by Mark Hopkins, a Kelly graduate, and C. Vinet, who previously was a pilot for Pittsburgh Airways. Engine repairs will be in charge of S. Hansen, formerly of the Wright factory. Recovering, painting and general ship repairs will be in the hands of H. McClain and George Schammel, both formerly with the Ludington Flying Service.

The Walz company, which is headed by E. J. Walz, has about $15,000 worth of engine tools, machine tools, grinders, lathes, special fittings; also recovering, sewing, fuselage repair and carpentry equipment. It has a well equipped paint shop, and large, uncrowded, heated hangars. The firm is dealer for Pioneer instruments, Switlik parachutes and a general line of accessories. The company also is agent for Aeronca, Fleet, Bird, Monocoupe, Travel Air, Stinson, Stearman, Bellanca, Northrop, Sikorsky, Douglas, Beechcraft and Lockheed planes and Pitcairn autogiros as well as sells a large variety of used planes.

Oklahoma City Field Being Beautified

AN EXTENSIVE LANDSCAPING PROGRAM has been started at the Oklahoma City Municipal Airport, under the direction of Donald Gordon, park department superintendent, with the assistance of W. E. Fletcher, airport manager. It will give Oklahoma City one of the first sunken gardens designed especially for the effect from the air. "Oklahoma City Airport," in eighteen-foot letters formed by flowers and shrubs, will be the center piece, located in an oval between the roadway approach and the Air Terminal Building. Shrubs already have been set out twenty feet from the field fence to border a walk for visitors.

California Kinner Dealer Selected

HARVEY MARTIN of Long Beach Municipal Airport, Calif., has been appointed dealer for Kinner aircraft and has taken delivery of a Kinner Sportster.

Commercial Flier Changes Headquarters

E. HEDEEN, former manager of Air City at Racine, Wis., has moved his aerial equipment to the Kenosha, Wis., municipal airport and will operate from the latter city in the future. He engages in commercial flying and has two Wacos in Kenosha.

Columbia, Mo., Airport Established

THE MUNICIPAL AIRPORT at Columbia, Mo., has been completed. There are 110 acres in the field, and it has four runways, two 500 feet wide by 3,000 feet long, and two 500 feet wide by 2,000 feet long. Carl McClure, a transport pilot, who was formerly manager of the municipal airport at Springfield, Mo., has complete charge of the operation of the Columbia field.

Official dedication of the new airport will take place sometime during the early summer.

Los Angeles Airport Director Honored

COL. RICHARD B. BARNITZ, director in charge of the Los Angeles (Calif.) Municipal Airport, recently succeeded Dudley Steele of the Richfield Oil Co. as chairman of the Los Angeles Chamber of Commerce aeronautical committee.

New Airport for Nashville Urged

THE BOARD OF GOVERNORS of the Chamber of Commerce of Nashville, Tenn., favors immediate construction of a new municipal airport if funds can be obtained from the Reconstruction Finance Corp. The airport would be built on a self-liquidating basis to take care of the loan.

A site ten miles from the city limits and containing 445 acres has already been selected. The cost of the site, equipment, drainage and other incidentals is estimated at $338,835.

Wayne County (Michigan) Airport

WAYNE COUNTY AIRPORT lies about sixteen miles southwesterly from Detroit, occupying one square mile and bounded by Middle Belt and Goddard roads on the east and south respectively and Merriman and Wick roads on the west and north.

At night the field can be picked up by a flier better, perhaps, by the red glow from the large neon signs on the two hangars than in any other way, as the night air mail pilots report that they can see this large red glow in a southwesterly direction from Detroit long before they can distinguish the 8,000,000 candlepower revolving beacon at the port.

As the airport stands after two full years of operation, the hangar buildings have proved efficient in design and adequate for all purposes; the landing field has developed a fine, heavy sod over its entire area; the drainage system has met every rainy period with satisfaction; the night lighting equipment has been spoken of by the pilots who have used it as being as fine as any they have seen, and the radio equipment at the airport is now in daily use, aiding pilots flying to and from Detroit.

Wayne County Airport has been given an A-T-A rating by the Department of Commerce, which rating is the highest they issue and is available for only those airports which have transport lines operating from them. The requirements exacted for such a rating are such that a flier can find service and facilities for all his needs at any time of day or night.

The Department of Commerce, Aeronautical Branch, has located its midwest divisional offices at the Wayne County Airport, from which they handle the licensing and yearly relicensing of all pilots, parachute riggers, planes and engines in Ohio, Kentucky, Indiana and Michigan.

The Department of Agriculture has established a weather reporting station for air activity in this district at the airport. From this office the latest weather reports from any point in the United States can be obtained, as it is continually in touch by radio and teletype with all parts of the country, while weather reports covering the entire northern hemisphere are received twice each day. Twice daily large weather maps are drawn of the northern hemisphere, and the centers of the high- and low-pressure areas are indicated thereon, together with the temperature, barometer reading, wind direction and velocity, amount of precipitation, if any, and amount of clouds at 250 cities in this area. With the hourly reports coming in by long-wave radio and teletype from all over the Middle West, the movements of storm areas can be followed closely and thus accurate weather information can be given to pilots. This service is given free of charge to the flying public.

The Treasury Department has designated Wayne County Airport a port of entry through which visitors from Canada may enter the United States.

The 107th Observation Squadron, Michigan National Guard, occupies the military hangar at the airport, where it carries out a comprehensive routine of training in military flying. There are 126 officers and men in this organization, twenty of whom are military pilots and many of whom have been graduated from the Regular Army military school for aviators. This branch of the Government is equipped with eleven airplanes.

The photographic branch of the squadron has equipment for making mosaic maps and obliques, together with a laboratory for developing and enlarging the pictures taken. This squadron is equipped with a complete machine shop, for overhaul work on planes and engines, which can be converted into a mobile shop for use in the field on maneuver trips.

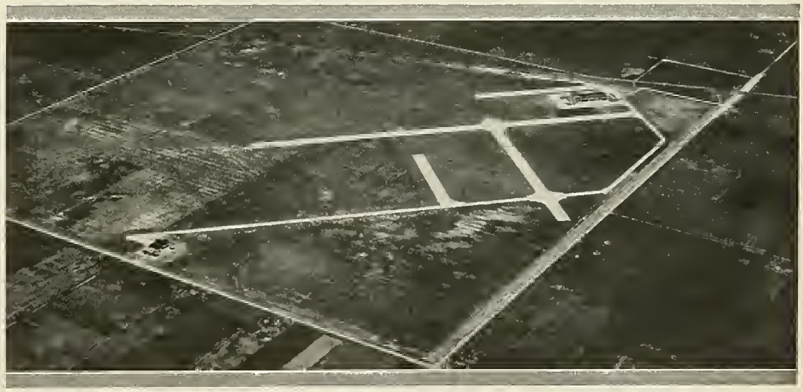
About forty-four planes are stored in the main hangar building at the present time. Most of the owners of these planes are individuals who use airplanes either in their business or for pleasure. Four schools and two flying clubs conduct their activities at this airport.

Over a two-week period there were 153 landings and 153 take-offs by military fliers and 618 landings and 619 take-offs by the commercial and pleasure fliers.

The cost of operation of Wayne County Airport for the current year has been carefully considered, and economies have been instituted in several ways. The cost of this year's operation is about one-third lower than that of last year.

One of the two measured speed courses in the United States is located at Wayne County Airport and is known as the "Count de la Vaux" speed course. It is three kilometers long and was named after a former president of the Federation Aéronautique Internationale.

Daily bus service is available to those who care to visit the airport.



Wayne County Airport's unobstructed approaches and runways are shown in this air view

• NEWS OF THE SCHOOLS •

Tarkington Offers Free Ground Courses

THE TARKINGTON AVIATION CO. of Indianapolis, Ind., has announced the inauguration of free aviation ground courses, covering twelve weekly lessons. The classes are held Tuesday or Thursday evenings at the Indianapolis Municipal Airport. Subjects covered in detail include: Theory of flight, the airplane, structure and types, instruments, engines, navigation, meteorology, Department of Commerce regulations, air traffic rules and airplane operation. It is planned to continue the series of ground course groups under the instruction of Elvan Tarkington and George Gamsjager.

Bus Drivers Take Flying Courses

A NUMBER of Greyhound bus drivers whose headquarters are at Tulsa, Okla., are taking flying lessons from the Field Flying Service at Tulsa. The school is owned by Earl A. Field, with Fred Braymer as chief instructor.

Boys Study Bombing Construction

BOMBING PLANES on a graduated scale are being constructed by pupils in the airplane sheet metal shop at the Boys' Vocational School, Baltimore, Md. The students began with the building of small models, and the size of the planes they are making is gradually being increased. The class is completing an almost full-size bombing plane. The work is being done under the direction of Hugo Mele, instructor of the class. The students work directly from blueprints, and pattern layout work is particularly stressed. Related training, such as welding, is included in the plane construction class of the school.

Williams and Stinis Operate School

ERICKSON & REMMERT Flying School, a Government-approved school at Floyd Bennett Field, Brooklyn, N. Y., is now under the supervision of Roger Q. Williams and A. Stinis. Fleets, Wacos and Birds are used for instruction.

Agent for Spartan Aircraft Appointed

PHILIP SMOOKLER of New York, eastern representative of Spartan School of Aeronautics, Tulsa, Okla., has been appointed sales agent of the Spartan Aircraft Co. As a special inducement this month, a complete flying outfit is being offered to all prospects for transport or limited commercial courses in the Spartan school.

St. Louis Club Teaches Flying

AN AVIATION CLUB which will provide flying instruction for its members has been established at the Lambert-St. Louis Municipal Airport, Mo., with Lieut. Edwin Lauth, a member of the 110th Observation Squadron, Missouri National Guard, in charge.

Woman Obtains Transport Pilot License

MRS. IOLA FRANKLIN of St. Louis, Mo., recently became the third woman at Lambert Field to receive a transport pilot's license. She has spent eighteen months in air training and is a graduate of Von Hoffman Air College. She also studied a post-graduate course under Lieut. M. R. Bouse of the Bouse School of Aviation and has had over 260 hours of solo flying.

Flying Instruction at Washington

RUSSELL KERR and D. Schall have organized a flying partnership and are giving flight instruction at Washington-Hoover Airport, Washington, D. C. A four-place Stinson Junior is used. Mr. Schall is a son of Senator and Mrs. Thomas D. Schall of Minnesota.

Parks Adds to Equipment and Courses

PARKS AIR COLLEGE, East St. Louis, Ill., has acquired a large number of ships to augment its present flight training facilities. The J-5 Travel Air has been added to the training fleet to provide instrument flying as a part of the transport pilot course. It has a top speed of 130 miles per hour and is equipped with a long-wave receiving set, which enables the student, in a hooded cockpit, to fly blind. Twenty hours of instrument flying is included in the advanced flight courses at Parks Air College.

Recent additions to the curriculum include a special course of drafting for all airplane engine mechanics; additional training for master mechanics includes stress analysis, advanced aerodynamics. Master mechanic students also will receive complete education in business management.

Instructor Joins Boeing Faculty

WELLWOOD E. BEALL has become associated with the Boeing School of Aeronautics at Oakland Airport, Calif., as instructor in mechanics, materials of fabrication and airplane design. While at New York University, Mr. Beall won the Wright-Guggenheim Design Contest prize with drawings of a high-wing cabin monoplane, equipped with slots and flaps on its tapered wings. He entered the commercial field as consultant in all phases of aeronautical science and later became assistant chief engineer for the Walter M. Murphy Co. at Pasadena, Calif.

School Adds Aeronautical Engineering

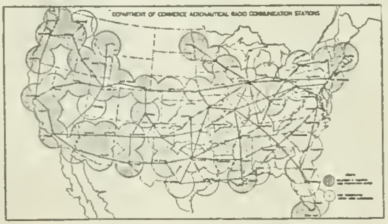
THE DETROIT Institute of Technology, Y. M. C. A. Building, Detroit, Mich., has organized a department of aeronautical engineering, headed by Alex Lavrow, formerly an aircraft engineer with the Airplane Division of the Ford Motor Co. Regular courses leading to a degree of bachelor of science in aeronautical engineering are given in both sections attending college on a cooperative plan basis. Small classes, a "learn-as-you-work" plan and arrangements for deferred tuition payments are features of the school.

Salesroom Opened at Parks College

A SALESROOM, devoted entirely to the marketing and display of airplanes, has been opened in Parks Air College in East St. Louis, Ill. Sales activities at the school are under the supervision of Oliver L. Parks, president.

School Installs Radio Equipment

THE HARTUNG AIRCRAFT CORP. school at Detroit, Mich., has been assigned call letters and a two-way communication license from the radio commission. The installation will be used both for radio instruction and for flying instructions from the ground to recently soloed students. It is reported to be the first school in the vicinity to make the installation.



DEPARTMENT OF COMMERCE AERONAUTICAL RADIO COMMUNICATION STATIONS
RADIO WEATHER STATIONS

This RADIO EQUIPMENT installed by the Federal Government at a cost of millions, is all available to you in the low priced

WESTPORT AIRCRAFT RADIO RECEIVER

"Ask the Pilot Who Flies With One"

Billy Parker—Mgr. Aviation Div., Phillips Petroleum Co.
Leslie Bowman—Western Factory Rep., Waco Aircraft Co.
Vance Breese—Air Express Corporation
W. E. Thomas—Pres. Pacific Airmotive Corporation, Ltd.
H. C. Lippiatt—Calif. Distributor, Waco Aircraft Co.
Hank Frese—Continental Oil Company

Write for Particulars

PACIFIC AIRMOTIVE CORPORATION, LTD.
United Airport, Los Angeles
Oakland Airport

LEARN A TRADE PROTECTED BY THE GOVERNMENT

Casey Jones' SCHOOL OF AERONAUTICS

DOWNTOWN SCHOOL

LOCATED AT the hub of Newark's transportation system, twenty minutes by tube from New York City. The School's field service station and hangar are at Newark Airport—the world's busiest airport—seven minutes from the downtown school.

"The men who take their mechanical training now will service the world's airplanes in the near future"—Casey Jones

WHEN we opened our School of Aeronautics three months ago, we stated the belief that, "in spite of existing conditions, the youth of America are optimistic as to the future—of the country and of aviation." The reception our school has received justifies that belief. Student enrollment in our various courses is nearing the hundred mark. To accommodate them, we have doubled our facilities, added to our equipment and increased our faculty to ten men, all experts.

Our plan is endorsed by many of the large operators who are confident—as we are—that commercial aviation is just starting; that it may lead the way to general business recovery; and that the future holds great promise for those who prepare now for a career in aviation. The men who take their mechanical training now will service the world's airplanes in the near future.

On every side you see the need for adequate national defense. Trained airplane and engine mechanics and engineers will be of inestimable value to the government in the event of a national emergency.

NEW ENGINEERING-MECHANICS COURSE

TO MEET the demand for men with practical and theoretical training as both mechanics and aeronautical engineers, we have added to our curriculum a two-year Engineering-Mechanics Course.

Frequently the engineer is well based on theory but lacking in practical mechanical experience. Likewise, the mechanic who wishes to better himself will have the opportunity of doing so if he has a working knowledge of engineering.

This course is offered to those who cannot afford a four-year university course; to mechanics with the necessary education who are interested in engineering, and to those who desire a technical and practical knowledge of aviation.

CASEY JONES SCHOOL OF AERONAUTICS, Inc.

558 BROAD STREET, NEWARK, N. J.

Please send me literature on your school. I am interested in

☐ Regular Mechanics Course
☐ Master Mechanics Course
☐ Expert Welding Course
☐ Engineering-Mechanics Course

Name .... Age..........
Address ....
City and State ....

• THE AIR SERVICES •

Test Flights of the "Macon"

THE FIRST TRIAL FLIGHT of the U.S.S. *Macon* was scheduled to take place from Akron, Ohio, beginning March 30. The ship will remain the property of the Goodyear-Zeppelin Corp. until the satisfactory completion of the tests and its final acceptance by the Navy, although Comdr. A. H. Dresel and his officers and crew ordered to duty with the *Macon* will comprise the personnel which will have charge of the operation of the airship throughout the trial flights. These tests are conducted by the Board of Inspection and Survey, under Rear Admiral George C. Day of the Navy Department.

The trials of the *Macon* are expected to be of about six weeks' duration. About six flights will be made, one of which will be an endurance flight of about fifty hours. No aircraft will be allowed to fly closer than one-half mile from the airship during the tests.

It is expected that the *Macon* will be delivered to the Naval Air Station, Sunnyvale, Calif., about May 1.

Naval Plane for President Roosevelt

A TWIN-MOTORED DOLPHIN AMPHIBION, constructed by the Douglas Aircraft Corp., Santa Monica, Calif., has been delivered to the Navy Department for use by President Franklin D. Roosevelt. This ship is similar to the Douglas Dolphins used successfully by the Coast Guard.

Naval Organization Changes

ADMIRAL WILLIAM V. PRATT, Chief of Naval Operations, has approved a modification of the Naval aeronautical organization afloat which will become effective April 1. Under the new plan, the aircraft carrier *Lexington* will be transferred to the Commander Aircraft of the Battle Force; the airship *Akron* will be transferred to the Commander Scouting Force, and the office of "Commander Aircraft, Scouting Force," will be discontinued.

The U.S.S. *Wright,* aircraft tender, will become the flagship of the Commander Aircraft, Base Force, and, in addition to the planes assigned the *Wright,* this force will include the Fleet Air Base and Aircraft Squadrons at Coco Solo, Canal Zone, and the Fleet Air Base and Aircraft Squadrons at Pearl Harbor, Hawaii, as well as all the minesweepers for duty with aircraft now assigned to these air bases and to the aircraft, Scouting Force.

Marine Reserves' Commander Chosen

CAPT. LIVINGSTON B. STEDMAN has been named to command the newly organized reserve aviation section of the Marine Corps' Department of the Pacific. Captain Stedman will maintain headquarters in San Francisco and will direct aviation activities of reserve squadrons at Oakland, Long Beach and Seattle airports.

Anacostia Head Has Long Air Record

CAPT. WARREN G. CHILD, commanding officer of the Anacostia (D. C.) Naval Air Station, will have completed eighteen years of continuous service in Naval aviation this month.

Air Reserve Officers May Transfer

BECAUSE there are very few assignments suitable for the large number of non-rated officers in the Air Corps Reserve, it has been announced that such officers may qualify professionally for transfer to another section of the Officers' Reserve Corps before December 31, the last date for such qualification, provided that they are eligible for assignment, active duty and promotion. In the absence of transfer qualification, a non-rated Air Reserve officer will be allowed to continue in his current commission until it expires, but in case there is no suitable vacancy in the Air Corps Reserve, he will not be given a reappointment. The same procedure will be followed if transfer is not secured before expiration of his commission, even though he may have qualified for transfer. Those whose commissions expire on or before December 31 will be reappointed, if they meet the requirements of the regulations for reappointment with eligibility for assignment, active duty and promotion.

Squadron Insignia Approved

A BLACK PANTHER with a red tongue has been approved as the insignia for the 35th Pursuit Squadron, Langley Field, Va. The panther is portrayed courant, facing dexter, on a silver oval within a blue border.

Aerial Delivery Unit Constructed

DEVELOPMENT of an inexpensive aerial delivery unit, designated as Type A-3, has been completed at the Materiel Division of the Army Air Corps. Experimental drop tests were conducted with this type unit, which is composed of a salvaged twenty-four-foot service parachute canopy attached to a cylindrical-shaped bag of duck fabric in which is stowed a five-gallon commercial milk can in a separate compartment. The complete unit is carried in and released from the wing bomb racks by means of a static line attached to the apex of the container. Its operation and function are identical to the previous Type A-1, but it is of a simplified and less expensive design.

Air Medical School Head Appointed

LIEUT.-COL. ALBERT P. CLARK, Medical Corps, has been designated as commandant of the School of Aviation Medicine at Randolph Field, Tex. His duties are of a triple nature, since he also is the post surgeon of Randolph Field and flight surgeon of the Air Corps Training Center.

Coming from five different states and one foreign country, nine medical officers recently entered the School of Aviation Medicine to take a four months' course in specialized aviation medicine. Included among those listed is Maj. Joseph Shiang-Min Lee, Medical Corps, Chinese National Air Force.

Chanute Field Building Activities

PLANS and specifications for sixteen sets of non-commissioned officers' quarters have been received at Chanute Field, Rantoul, Ill. The proposals are for the sixteen sets to be constructed in eight double sets.

Wright Field Engineer Receives Medal

RECOGNIZING his work on engine pressure indicators on test engines as the most outstanding contribution to aeronautical engineering for the year 1932, the Society of Automotive Engineers has presented the Manly Medal to F. L. Prescott of the Power Plant Branch, Air Corps Materiel Division, Wright Field, Dayton, Ohio. The Manly Medal is awarded each year by the Society of Automotive Engineers for the outstanding contribution to aeronautical engineering for the year and is given to perpetuate the memory of Charles M. Manly, who, working with S. P. Langley, airplane pioneer, was among the first to adapt the internal combustion engine to aircraft use.

Mr. Prescott is a senior mechanical engineer of the Power Plant Branch, specializing in engine research and design. He is the second Wright Field engineer to receive the medal, a total of only three awards having been made. The first award was to S. D. Herron, of the Power Plant Branch, in August, 1929, for outstanding work in the development of air-cooled cylinders and fuel investigations.

Selfridge Fliers Aid State in Surveys

AERIAL SURVEYS of approximately 200 towns for the purpose of town marking have been completed by officers of Selfridge Field, Mich. This survey is to continue until all towns and cities in at least southern counties of the state are surveyed. It is hoped that the entire state can be covered in the course of another year.

(Continued on following page)

KEEPING PACE WITH THE NEEDS OF THE NAVY

With a sound background of years of service experience in the exacting requirements of the Fleet, CHANCE VOUGHT CORPORATION has built the "CORSAIR." Rugged, dependable, durable, and, in addition, has continued refinement in aerodynamic design which has kept "CORSAIR" performance in the fore.

CHANCE VOUGHT CORPORATION

SUBSIDIARY OF UNITED AIRCRAFT AND TRANSPORT CORPORATION

(*Continued from preceding page*)

Naval Aviators Praised by Swanson

SECRETARY OF THE NAVY SWANSON has commended Lieut. (j.g.) Robert B. Pirie, on duty at the Naval Air Station, Anacostia, D. C., and Chief Radioman Clayton W. Bailey, a passenger in the plane, for their efficiency and skill displayed after a take-off from Scott Field, Ill., when due to a material failure in their plane's landing gear, it became uncontrollable from the cockpit. After Radioman Bailey had vainly attempted to remedy the defect by climbing out on the wing, Lieutenant Pirie skilfully landed the plane with only slight damage.

Landscaping at March Field

BEAUTIFICATION of the grounds and buildings at March Field, Riverside, Calif., has progressed during the past three years since the extensive construction program began. The re-landscaping of the post and the complete replacement of old buildings by new construction has necessitated an extensive program of planting and planning. Through the cooperation of the California State Experimental Farm at Davis, Calif., and various commercial concerns, a large number of shrubs, trees and perennial flowering plants have been planted over the entire building area of the post.

The new gymnasium at the field has an unusual floor. A slab of concrete, five inches deep, forms the base, and this is covered by one-half inch of tar-concrete mixture to make it waterproof, preserve it and give it life and spring. On top of this are placed 2-inch by 4-inch sleepers, 16 inches apart, which are anchored to the concrete. This network is filled with the same mixture of tar and concrete that is on the layer directly above the base. On top of this is a ¾-inch pine sub-floor, topped with ¾-inch maple covering. The balcony has a capacity of 440 seats. It is planned to construct six bowling alleys in the new building.

Pensacola Holds Safety Record

THE NAVAL AIR STATION at Pensacola, Fla., has won the Navy Department Safety Trophy for Group II Stations. The accident prevention record made by the station was not marred by loss of life or by a serious injury and was unexcelled by any Group II Station for any year since records have been kept. During 1932 the station completed a total of 42,000 flight hours with no fatalities.

National Air Map Improved

THE REVISION by the Naval Hydrographic Office of the Upper Air Chart for the United States consists of increasing the size of the chartlets by approximately one-third and the elimination of topography and all lines except state boundaries, parallels and meridians. The cross-sectional diagrams for plotting aerographic data and the columns for entering clouds at the bottom of the chart have also been eliminated. An additional chartlet has been inserted for entering observations of clouds.

Kelly Field Class Is Graduated

A CLASS of ninety-one students was graduated from Kelly Field, Tex., recently, and preparations were immediately made for a new class of ninety-six student fliers from Randolph Field.

Boeing to Start on Army Order

WITH THE FIRST of the fleet scheduled to take to the air in June, work is getting under way at the Boeing Airplane Co.'s plant in Seattle, Wash., on the 111 all-metal, low-wing single-seater P-26A pursuit planes recently ordered by the Army Air Corps. The production schedule calls for two planes a week for ten weeks and three planes a week thereafter, starting about June 14, with completion of the order set for April 11, 1934.

Completion of 113 single-seater, Wasp-powered carrier fighters of the F4B-3 and F4B-4 type was accomplished recently by the Boeing company with a shipment to San Diego. Production of these high-performance military planes was begun in 1931, with the fighters going to both the east coast and west coast Marines, as well as to the Navy's aircraft carriers.

Hatbox Field Head Transferred

LIEUT. ROY CAMBLIN, commander of Hatbox Field, Muskogee, Okla., has been ordered transferred to the new Barksdale Field, Shreveport, La. The officer took over command of the field in May, 1930, and has been active in its development.

Tennessee Squadron to Receive Planes

SIX NEW PLANES are to be added to the equipment of the 105th Observation Squadron, Tennessee National Guard, at Nashville. The ships, which will be delivered in June, will be Douglas O-38's, powered with 650-h.p. Pratt & Whitney engines.

Hensley Field Being Improved

WORK is progressing rapidly on Hensley Field, the Army Reserve flying field at Dallas, Tex., and improvements are expected to be completed by May 1. A new water pumping system has been installed, non-commissioned officers' quarters, officers' quarters, roads, field lights, a sanitary sewerage system and runways are being constructed. The annual summer training school for reserve officers will be held at Hensley Field in July and August.

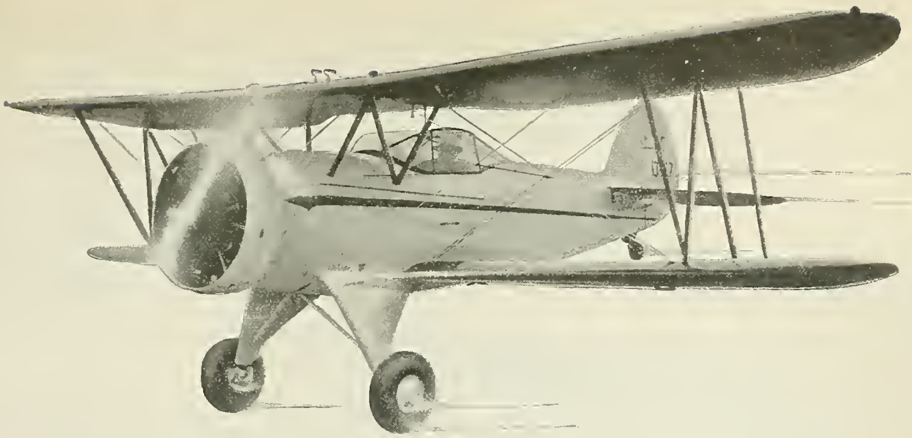
Cold Weather Photography

ONE OF THE LATEST developments in the training of aerial photographers at the Army Air Corps Technical School, Chanute Field, Ill., has been overcoming the difficulties encountered in sub-zero weather. The addition of this new development to the list of achievements already made in photography by the Army Air Corps since the War greatly increases the usefulness of aerial photographic observation and mapping in military and peacetime operations. This service has developed tropical developing and printing methods, quick-work processes, laboratory operations during flight, night photography, multi-lens mapping methods, long-range photography, together with a number of less important developments, and with the addition of arctic training it will be in a position to furnish twenty-four-hours-a-day service to the Army at any point on the globe.

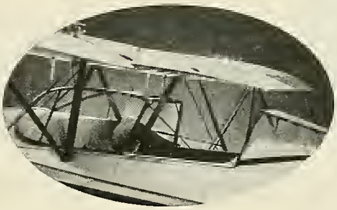
During the winter months, the officers and enlisted students of the Army Air Corps Technical School have been receiving training in the operation of the new Air Corps field laboratory trucks and have produced excellent results in temperatures ranging as low as ten degrees below zero. Two four-wheel-drive, three-ton trucks, manned by one officer and twenty-four enlisted men, and equipped with powerful electric generators and latest photographic laboratory equipment, are being used for this training. One truck is used entirely for the development of aerial films, and the second truck is used for the printing of negatives, with a capacity of approximately 8,000 eight-by-ten contact prints and enlargements in twenty-four hours. A large tent, 30 by 70 feet, covers the entire unit when in operation and affords additional space necessary for drying the prints, chemical mixing, administrative work and housing and rationing the personnel. The four-wheel-drive trucks have excellent traction and when equipped with chains are capable of operating in exceptionally deep snow.

The unit is generally located on the bank of a small stream several miles from the home airdrome. A small hole is chopped through the ice, and the water is pumped to the trucks by a small electric pump. A number of ingenious ideas to control the temperature of the developing solution, film drying, heating and ventilation have been devised. The problem of drying a roll of film, 75 feet long and 9 inches wide, in sub-zero temperature presents the most difficult problem.

An airplane is assigned to the unit on all training missions; the films are exposed and dropped from the plane to the laboratory unit in small parachutes, and the films are developed, printed, assembled and delivered to the home airdrome in three hours.



HERE'S THE NEW WACO MODEL "A" FOR 1933



...AND IS IT A HONEY!

● At first we didn't see how we could greatly improve the 1932 Model "A" WACO. But you can always find a way to do a thing if you try hard enough. So we went to work and the first thing you know we had figured out no less than *twelve major improvements!* Not "gadgets," mind you, but important new developments—every one worth talking about.

It would take too long to go into detail here, but we'll be glad to send full particulars to anyone who's interested, because we're enthusiastic about what we've accomplished and want the world to know about it.

Briefly, we've got a ship that any man can be proud to own and happy to fly. The seats are side by side. That's for sociability. There's room for luggage—golf clubs—guns—fishing tackle—whatever you want to carry—100 pounds or more of it. That's so you can start on a sizeable trip without worrying about who's going to take care of your laundry en route.

And here's something else. You can make an open or a closed cab of this ship simply by pushing the top forward or backward!

As in all WACOs, this model takes off or lands on a dime. It's a brilliant performer that almost handles itself. It's safe—sturdy—beautiful to look at.

This sounds like almost too much to expect in one ship. That's why we always urge prospective buyers to *fly* it. It proves its right to lead the parade better than anything we know of.

P. S. We've got such an unusual proposition for dealers that we're anxious to get in touch with a few more. There's a real proposition in connection with the WACO franchise for 1933.

HERE ARE THE 12 MAJOR IMPROVEMENTS THAT WILL KEEP WACO OUT IN FRONT AND UP ABOVE AGAIN IN 1933

1. *Better streamline—including landing gear.* **2.** *Rounded fuselage.* **3.** *Improved top. No doors, cracks, leaks. Opened or closed by sliding backward or forward.* **4.** *Wider cockpit for greater comfort.* **5.** *Deeper, more luxurious upholstery.* **6.** *Center throttle easily accessible to both pilots.* **7.** *Dual control installed either in the air or on the ground.* **8.** *Central emergency brake.* **9.** *Greater visibility.* **10.** *Greater speed.* **11.** *Fully equipped, including air speed indicator.* **12.** *More beauty in design and finish.*

THE COST? MUCH LESS THAN YOU'D EXPECT

With Jacobs 170 H. P. engine, only	$4,285.00
With Continental 210 H. P. engine, only .	4,895.00
Winter enclosure	195.00

THE WACO AIRCRAFT COMPANY, TROY, OHIO

WACO
AIRPLANES
"ASK ANY PILOT"
WACO LEADS IN AIRCRAFT REGISTRATION

HOWARD AILOR
invites you to the first preview in the East, of

THE NEW WACO LINE FOR '33

• ***APRIL 22nd to 30th*** are the dates when metropolitan New York, New Jersey and Connecticut will have the opportunity of attending the first official showing in this territory of Waco's new line for 1933. Dealers, commercial operators, private owners and individuals contemplating the purchase of a plane are cordially invited to examine these beautiful new aircraft at our hangar, and to witness their sparkling performance in the air. Come, and let us show you Waco's interpretation of aircraft value.

On display you will see the Waco planes which established new precedents in performance, economy and construction standards—featuring numerous interesting improvements such as only a leader can offer. You will see the Continental-powered Deluxe Cabin—a classic of aircraft design; the Jacobs-powered Model "A"—with side-by-side seating and a new convertible cockpit enclosure which will win the favor of the most critical sportsman pilot; and the popular Continental-powered model "F-2"—three-place all-purpose open cockpit plane.

Make a note on your calendar now, to get out to Roosevelt Field for this preview. When you see Waco's new line and check the prices and performance, you will see why Waco leads in aircraft registration. *Remember the dates . . . Saturday, April 22nd until and including Sunday, April 30th.*

• During this preview the Roosevelt Field authorities will throw open to the public their museum of historical and wartime airplanes.

AERONAUTICAL CHAMBER OF COMMERCE

WACO
SALES
OF NEW YORK, INC.
Hangar 16, Roosevelt Field, Mineola, N. Y.
Telephone GArden City 5313

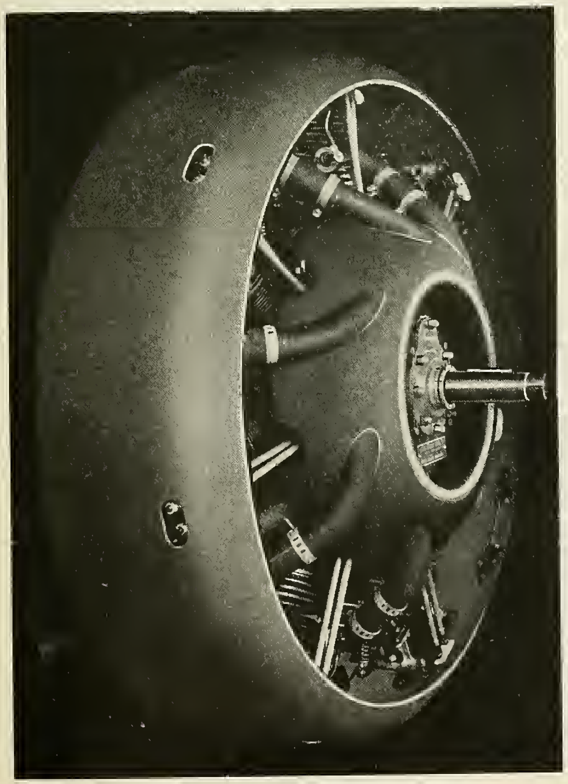
CONTINENTAL • JACOBS • WARNER ENGINES • PARTS • SERVICE
JOHNSON'S WAX • KENDALL 30-HOUR OIL

● AIRCRAFT DEALERS: Handle Johnson's Wax sales in your territory—Establish your hangar as an Authorized Johnson Waxing Station—Display this sign and secure new business—Write for dealer information.

WAXING **DOES** MAKE A DIFFERENCE

● AT THE PREVIEW of the 1933 line of Waco aircraft to he held hy Mr. Howard Ailor at Roosevelt Field, April 22nd to 30th, all the planes on display are polished with Johnson's Wax. ¶ Quick to utilize every sales advantage and expedient of good will, many aircraft dealers, like Mr. Ailor, are using Johnson's Wax to emphasize and protect the beautiful finishes which the aircraft manufacturer is so careful to produce. ¶ A plane polished with Johnson's Wax need never look dull or weather-worn. The hard dry protective film of Johnson's Wax shields wing and fuselage surfaces from the destructive action of sun, rain, wind, sleet, dirt and grease. Its shiny smoothness actually adds m.p.h. to the plane's performance hy reducing skin friction to a minimum. ¶ Dealers, operators and private owners find also that waxing facilitates and shortens the time required for cleaning. Dirt and grease can he wiped off a waxed surface with little effort and without the use of harsh cleaning compounds. The cost, incidentally, is but a trifle. ¶ Taxi up to a hangar displaying the sign shown above and let an attendant polish a small section of your plane. You will want him to do the entire surface—or perhaps you would rather do it yourself, it's so easy. Johnson's Wax is available to you in several different size cans at any Authorized Johnson Waxing Station. If there is no Station near you, write direct to the company.

S. C. JOHNSON & SON
RACINE • WISCONSIN



THE JACOBS "170" provides the ideal power source for the WACO "A" and "F2" from the standpoint of ***high performance*** with ***economy.***

Jacobs owners not only feel secure in the knowledge that they have a most reliable engine, but have the further satisfaction of dealing with a company that stands whole-heartedly behind its products.

Mr. Howard Ailor, Roosevelt Field, has been appointed our New York Representative. New Yorkers can see the WACO "A" powered by JACOBS at Mr. Ailor's pre-view of the new WACO line.

JACOBS
AIRCRAFT ENGINES
POTTSTOWN, PENNA.

NEW EQUIPMENT and METHODS

AIRPLANE VENTILATION SYSTEM

PROGRESS in the heating and ventilation of airplanes is demonstrated in the new systems installed in the Stinson airplanes used on American Airways lines between Boston and New York. Three separate units are used in the system, one providing heated air, one providing cool air, while the third covers the exhausting of air.

The heating unit takes fresh cool air through the opening in the front edge of the lower wing. This air is passed over a chamber which is heated from the inside by the exhaust heat of the motor. Having been heated by going around this exhaust chamber, this air is then carried to the individual outlets at each passenger seat. The hot air may be regulated by the passenger for each individual seat, while the pilot also has a control to cut down the general supply of warm air. A heating unit is attached to each outboard motor for the cabin, making two systems independent of each other, while the heater from the center motor is used to warm the pilot's cabin.

The cold air system installed in these planes picks up cold fresh air at the leading edge of the wing and conveys it to the cabin, where it can be admitted through individual vents that may be turned on or off by the passenger at will. This system also can be regulated for the entire plane by the pilot.

The exhaust unit located in the ceiling of the passenger cabin operates to suck out foul and hot air through a specially designed venturi. This exhaust operates under the control of the pilot and serves to change the air in the cabin so as constantly to provide fresh air for the passengers.

A temperature indicator in the cabin registers on the pilot's instrument board, so that he is able to determine the condition of the air and heat in the cabin.

Special attention has been paid to the location of the outlets of these three units. The cool air enters just above the passenger's head and slightly behind him. This air naturally settles to the floor and mixes with the rising warm air which comes up through the floor heaters, producing a constant circulation. By using a number of small openings it is possible to eliminate heavy drafts or air blasts which were so common in earlier type planes.

AIRPORT TRAFFIC SIGNAL

THE Westinghouse airport traffic signal provides a simple yet certain method for ground control of traffic at airports. The signal's unusually high candlepower and wide beam spread make it legible from any part of the landing area for all taxi movements and take-offs. The top lens of the signal is red, the center lens amber and the lower lens green. When the signal is green, it indicates that the air is clear; when it is amber, all ground movements may proceed, but only after each pilot has assured himself that his next movement can be made safely; when the signal is red, all ground movements must stop, each plane remaining in its position until amber or green again is shown.

The base plate, housing, doors and cap of the signal are of cast silica aluminum alloy. The doors are provided with ventilating louvers, bug screens, safety chains and wing screws. A graphited asbestos gasket mounted in the door channel and clamped against a raised flange on the body makes a weather-tight joint. The cover on top of the signal is ventilated and can be removed.

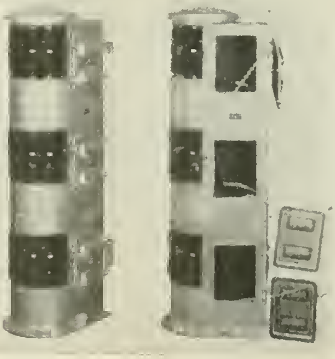
The lenses are nine-element Fresnel lenses, 240 mm. in diameter, 177-degree segments, of pressed heat-resisting glass.

FRESNEL AIRPORT FLOODLIGHTS

FOUR TYPES of Fresnel floodlights for landing fields and hangars are being manufactured by the Westinghouse Electric and Manufacturing Co. The floodlights give a pancake-shaped beam of medium candlepower with a horizontal spread of approximately 180 degrees.

The 1,500- and 1,000-watt sizes are used to illuminate fields by the distributed method and for supplementary lighting where the terrain is sufficiently uneven to cause shadows. They also may be used for lighting the interiors of large hangars.

The 300-500-watt and 100-250-watt sizes are used for lighting interiors of hangars, apron lighting, hangar roofs, roof signs, approaches to buildings, walkways and taxi strips. They also are used for protective lighting around hangars and administration buildings and for effectively illuminating sides of buildings and long, narrow signs.



Westinghouse airport traffic signal

CONTROL FOR RADIO STATIONS

RADIO RANGE BEACONS and radio communication stations at about 70 locations will soon be using remote-control operation, according to the Department of Commerce. Under the new arrangements radio operators will 'be stationed at airports, making broadcasts and controling equipment by using telephone circuits. Teletypewriter equipment for the dispatch and receipt of weather information also will be housed at the central stations.

Through the location of the control station at the airport, better coordination with air transport operators and fliers will be secured, and weather information will be available promptly, while weather maps will be obtainable immediately at the airport without resort to messengers. Emergency messages relating to local matters also may be expedited. Centralized control will reduce operation costs and promote efficiency.

Standard equipment for each control station is to include the following: machine-switching apparatus operated by a telephone dial; monitoring system, indicating to the operator what transmitters are operating; radio receiver, showing visually and aurally the quality of broadcast signals and the operation of the radio range; speech input equipment for amplifying microphone energy for transmission over a telephone wire to the broadcast transmitter; high-frequency receiver for reception of messages from aircraft in flight; batteries, line equalizers and charging equipment. Mounted on standard racks, this equipment will be enclosed within a sound-proof cabinet. At least one machine for the reception of weather messages on the teletypewriter circuit with which the station is connected and a page type machine and duplicating apparatus for making copies of weather maps also are to be located at the station.

Remote-control devices at the radio communication station will include a machine switch, secondary relays, a control transmitter and an amplifier. If the radio range beacon transmitter should be in a separate building, similar equipment would be provided for it.

Eighteen operations may be carried on from the airport station by dialing two digits, and the machine-switching apparatus will have a capacity of 100 functions. These operations will include warming up transmitting station radio tubes, preparing the station for use, operating the auxiliary broadcasting transmitter, cutting off the radio range from the air, closing the communication station broadcast, restoring the range station and controlling the obstruction lights on radio towers.

"STANLOID" SCREW DRIVERS

A NEW LINE of "Stanloid" screw drivers that combine a tip and bar of high quality with a handle that is designed to be shockproof and practically unbreakable is now offered by Stanley Tools, New Britain, Conn.

Tips of these screw drivers are hot forged and specially heat treated for toughness, and the angle of taper is designed to give maximum strength. Blades are forged from special steel, tempered over all and solidly anchored in the handles. A bolster is forged integral with each blade; continued pounding can not budge it nor drive the blade up into the handle. This bolster also adds massiveness at the right point to strengthen the bar when used for prying. The handle is made from "Stanloid," a special amber-colored composition that is unusually tough and which hammering will not break or shatter. It is shockproof and does not soak up oil or water.

The tools are made in five styles: heavy round shank, heavy square shank, electricians' round shank, adjusting and pocket type with pencil clip.

AIRSHIP SIGNAL SEARCHLIGHTS

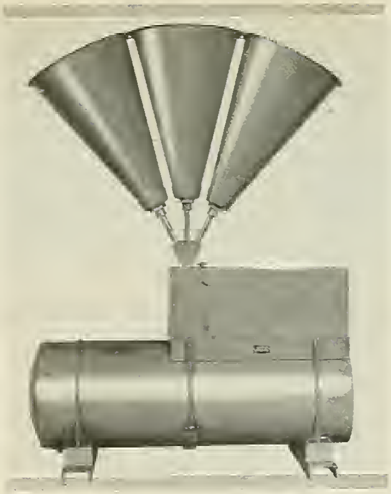
A WESTINGHOUSE 14-inch signalling searchlight has been designed for use on dirigibles, blimps and captive balloons. The 14-inch unit, complete with 20 feet of cable, weighs less than 12 pounds. The shutter is of unusual design, completely balanced and capable of 200 cycles per minute without fuzzing.

For 115-volt service, either A.C. or D.C., the searchlight is supplied with a medium prefocus socket for a 500-watt T-20 bulb motion picture projection lamp. With this lamp, the beam candlepower is about 450,000 and the beam spread is horizontal five degrees, vertical six degrees.

SMOKE BOX WIND INDICATOR

JOHN J. WHITE of Giro Transport & Sales Co., Inc., of New York, has developed a smoke box wind indicator for airports. Designed to be particularly helpful to students, the indicator shows the wind direction and helps to gauge its velocity at the ground instead of at the height of the buildings where wind cones usually are installed. Apparatus of this kind has been installed at the field of the Aviation Country Club of Westchester, Armonk, N. Y.

The smoke box is located at the center of the landing circle, from which a switch at the airport operations office starts the production of a predetermined volume of smoke. When the switch is turned off it cuts the oil supply, and the smoke ceases. Any kind of crude oil may be used, and the fuel reservoir is sufficient for at least 48 hours' operation. The power cost is small. A landing airplane can safely roll over the apparatus.



SONIC MARKER BEACON

A MEANS of using high-pitched whistles to designate the boundaries of an airport and thereby make it possible for a pilot to determine his position to make a blind landing has been announced by Chester W. Rice of the General Electric Co., Schenectady, N. Y. The sonic marker beacon, as the device is named, sends out fan-shaped beams of sound. Development of the beacon, which follows the same lines as the airplane sonic altimeter, also invented by Mr. Rice, has been going on at the Schenectady airport and at Wright Field for a number of years.

The sonic marker beacon consists of three 3000-cycle whistles mounted in sending megaphones. A motor-operated cam interrupts the air supply to the whistles for the purpose of coding the signal. The coding serves the double purpose of giving the pilot additional information and halving the air consumption of the device. The apparatus may be mounted on a truck with a suitable air compressor, where portability is desired, or permanently located on the boundary of a landing field.

Tests of the sonic marker beacon were first made by Capt. Albert F. Hegenberger of Wright Field, Dr. J. D. Tear of the General Electric research laboratory and V. A. Rickard, who flew over the marker in a cabin plane. Signals could be heard clearly without listening equipment at 800 feet. Later Captain Hegenberger and Mr. Rice made listening tests from an open-cockpit Douglas plane, using the sonic altimeter listening equipment. On this occasion signals were distinct at an altitude of 2000 feet, and further indications were that the beam could be heard at 3000 to 6000 feet. At 2000 feet the signal could be picked up 700 feet before reaching the boundary and was lost in the vicinity of the center of the field, a distance of 1000 feet.

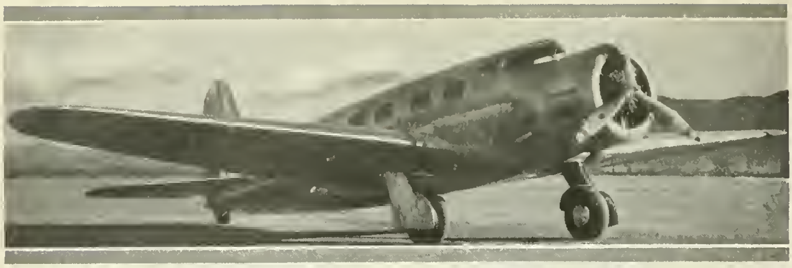
A typical installation of the device consists of two beacons used as boundary markers. The coding of the two stations would be so arranged that the two signals would combine to form a single note when the plane is equidistant between the two. Self-synchronous motors drive the coding valves. The aviator picks up the local airport radio beacon system at a distance of five to ten miles and is guided by it to the airport. Selecting an altitude of 2000 feet, he is held by the radio beacon on a line over the center of the field, and when he comes within 500 feet of the boundary, he hears the first of the sonic marker beacon stations, passes into the middle zone, and hears after that the second marker station. Circling and coming back twice more, at altitudes of 1000 and 500 feet, he has an idea of the size and extent of the field, and then approaching at an altitude of 250 feet, he makes a blind landing.

SHEET KAPOK INSULATION

A SOUND AND TEMPERATURE insulation material reported to be of exceptional lightness and high efficiency has been developed for use in the airplane industry. It is called Seapak and is made from kapok, which for years has been regarded as one of the finest of insulation materials, but the nature of which has prevented its being put into form convenient for handling. Seapak is kapok in sheet form.

Because of its lightness, insulation qualities and resistance to moisture, kapok has been used widely wherever its fluffy nature would permit. Seapak was developed during the past year and represents the first successful adaptation of kapok to sheet form. It is made by the Seaman Paper Co., Chicago, Ill., and is being used by several plane manufacturers. Seapak is made plain, with a thin paper membrane on one side and lined, using tough rope paper as a liner. Plain Seapak is made ordinarily in two thicknesses: 90 point and 125 point. This range is from about one-eleventh of an inch to approximately one-eighth in thickness. The paper membrane is about .003 of an inch in thickness.

Rope-lined Seapak is the same as plain Seapak, but on the face opposite that bearing the thin rag paper membrane there is added a lining of tough rope paper. This is made from ground-up ropes and contains no wood fibres. It is tough and compact, but when crumpled becomes soft, pliable and leathery. This kind of Seapak comes in the same thicknesses as plain Seapak, but the rope liner can vary from the thinnest film to the toughest and strongest sheet. This is easily controllable, so that the thickness of the Seapak and the kind of liner that best serves the purpose can be combined during manufacture.



Airplane Development Corporation MODEL V-1 TRANSPORT

THE Model V-1 Transport, produced by the Airplane Development Corp. is an all-metal nine-place, low-wing cantilever monoplane with retractable landing gear and tail wheel. The ship was designed by Gerard Vultee and built for the Airplane Development Corp. Flight tests have proved it to be one of the fastest cruising planes, and its future is looked to with particular interest by the air transport industry.

The Airplane Development Corp. is an engineering subsidiary of the Cord Corp., which is also the parent company for the Stinson Aircraft Corp. of Detroit. Don P. Smith of Los Angeles is president, while Gerard Vultee is chief engineer.

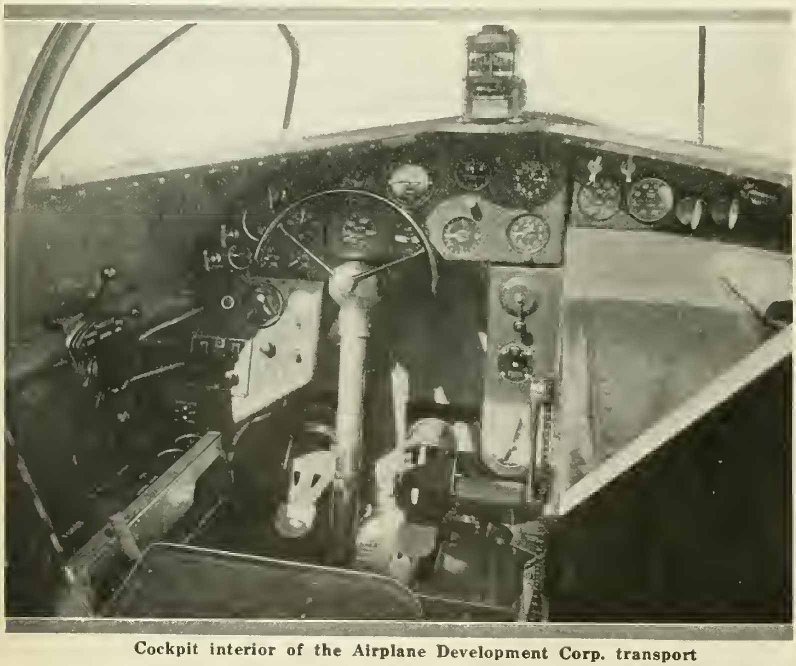
The new plane was engineered and constructed at the Grand Central Air Terminal in Glendale, Calif., and made its first successful test hop on February 19th, with Test Pilot Marshall Headle at the controls.

The most distinguished feature of its air launching was the fact that no major adjustments were necessary after its initial flight, and only a few minor changes were made throughout the course of its series of flight tests.

It is presumed that following its test by the Department of Commerce, Aeronautics Branch, the plane will be considered for use on the American Airways system.

As the ship is primarily intended to carry both passengers and mail on scheduled airlines, it is equipped with full night-flying instruments, flares and a complete Western Electric two-way radio installation.

Outstanding features of the new plane are its high top speed and cruising speed, its simplicity of construction, making for low maintenance cost, and the convenient arrangement of its roomy interior. Easy access is had to the pilot's compartment, both mail and baggage compartment, and to all parts of the plane which require inspection and service.



Cockpit interior of the Airplane Development Corp. transport

The plane is powered with the new Wright Cyclone Model F-2 engine, which develops 712 horsepower at 1,900 r.p.m. A three-bladed Hamilton Standard metal propeller, 9 feet 4 inches in diameter, is used. Sufficient gasoline tankage for a range of 800 miles is provided. The pilot sits on the left side of the cockpit, and a mail compartment of 20 cubic feet capacity occupies the right side. The pilot is separated from the passenger compartment by a sound proof bulkhead provided with a small door. The eight passengers are seated two abreast. Cabin seats are especially designed and are adjustable to three positions. A 12-inch aisle separates the seats. The fuselage is 62 inches high and 56 inches wide, and the cabin volume is 170 cubic feet. Ample room is afforded for comfortable seating arrangement. Behind the last seat is located the main cabin door, and opposite the door is a fully equipped lavatory, which is so arranged as to afford maximum room when in use. Behind the lavatory is the baggage compartment of 30 cubic feet, aft of which is the main radio installation.

The thick tapered cantilever wing is faired into the fuselage so that its bottom is tangent to the elliptical fuselage section. The wheels, which are completely enclosed and flush when retracted, fold inwards into the leading edge of the wing's bottom surface. The movement required for retracting the gear is simply a turn of the cantilever leg of the gear around a pivot tube. The fuselage itself is of modified elliptical cross section, and of true monocoque type having no longitudinals. This construction affords room inside the structure for given outside dimensions and also has valuable maintenance features.

The outer covering of the wing is smooth Alclad sheet. The structure is of the "shell" type, all bending and sheer loads being taken by the covering itself. This type of construction is rigid, both in bending and in torsion. A removable panel on the bottom surface of the wing affords access to the inside for inspection and repairs. The wing is constructed in three parts; the center section is built integral with the fuselage, and the center sections assemble to the center by means of bolts.

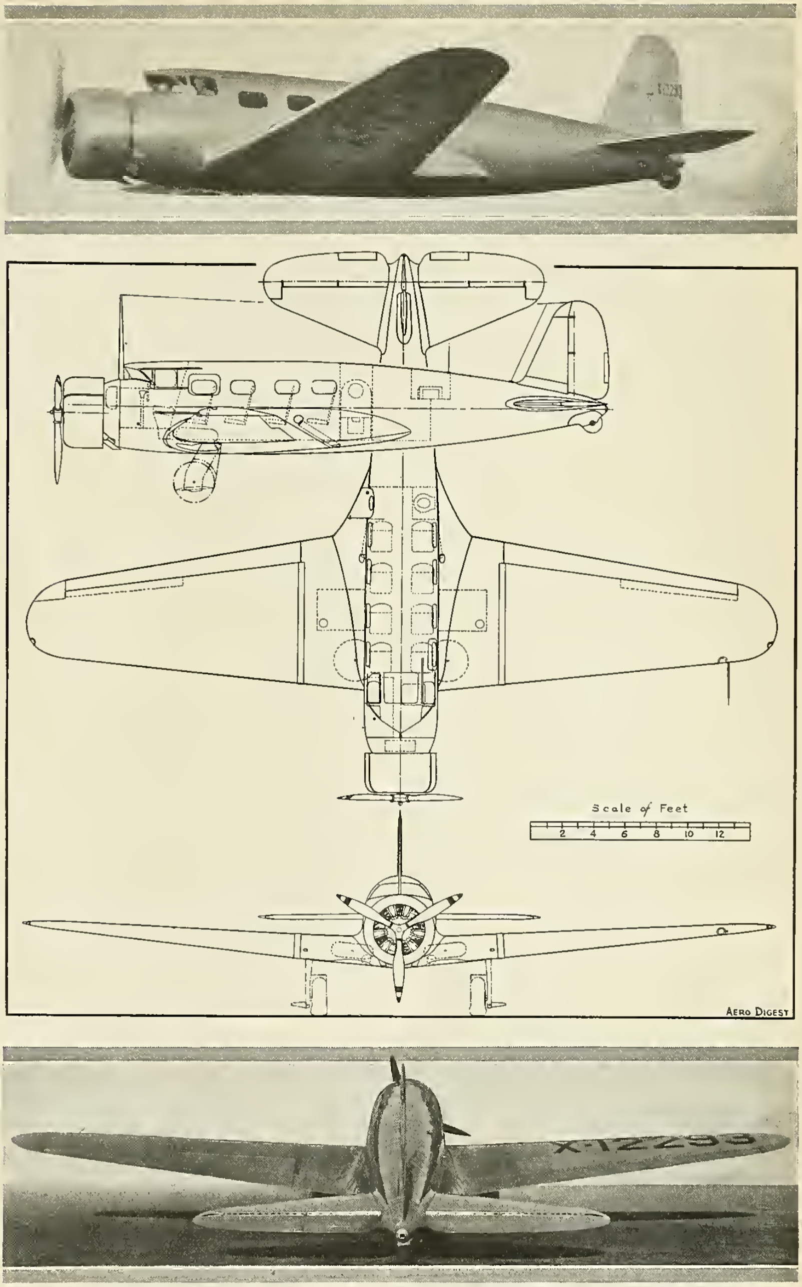
The retractable landing gear is of a novel and original type of construction. It is operated by a simple rotary motion about a pivot tube, the entire operating mechanism being merely a worm drive. The gear is operated by the pilot's merely throwing a toggle switch controlling an electric motor drive, which lowers the landing gear in about seven seconds. No other attention is necessary on the part of the pilot. An emergency manual control is also provided and suitable warning devices as well as a pointer in the cockpit which indicates the position of the landing gear at all times. With the power-driven retracting mechanism it is possible to retract the wheels immediately when the plane leaves the ground; in fact, on the take-off the wheels are usually completely up in the wing by the time the plane clears the boundary of the field.

The gear itself is composed of a pair of cantilever duralumin struts of rectangular section, to the upper ends of which are fastened segments of worm wheel. The lower end of each box-like strut contains an oleo shock-absorber unit to which a stub axle is attached. To this strut is fastened an automatically operating fairing which completely closes the wheel well and renders the bottom surface of the wing perfectly flush when the landing gear is retracted. A single cable runs from a point on the landing gear back through the fuselage to the tail wheel. This cable partially retracts the tail wheel as the landing gear is retracted.

The tail surfaces, like the wing, are of "shell" type construction. The fin and stabilizer are built solidly into the fuselage. An adjustment similar to that accomplished by moving the fin is made by setting an adjustable flap on the trailing edge of the rudder. Similar flaps on the elevators, which are operated by means of a lever in the pilot's compartment, take care of the stabilizer adjustment. This arrangement, especially in regard to the stabilizer, has particular advantages on a high-speed airplane in which the loads on an adjustable stabilizer become sufficiently heavy so as to render its operation difficult. When the plane is trimmed by means of the small flaps described above, this difficulty is eliminated. A substantial construction is accomplished for the entire rear portion of the fuselage when both the fin and stabilizer are built in solidly.

The fuselage construction is of a modified elliptical cross section, circular, arcs of one radius from the top and bottom, and of a larger radius from the side. These radii fair into each other. A flat Alclad sheet, its long dimensions running transverse to the longitudinal axis of the fuselage, is laid over transverse U-section diaphragms, each panel lapping back over the panel behind it. Inasmuch as these panels are relatively short in proportion to the total length of the fuselage, it is not necessary to form the sheet. This type of construction is simple to manufacture.

For maintenance in the field, it is possible to remove one or more of these panels from the fuselage by merely drilling out the rivets. These panels may be flattened out, and using the flattened panel as a template, a new piece of sheet can be cut and drilled. This new sheet, when assembled into the fuselage and lined up through the holes, will fit perfectly. This operation can be performed by any reasonably skilled metal worker and requires no special jigs or apparatus to keep the fuselage in line. This feature of the construction is particularly valuable, as most repairs on monocoque metal fuselages are expensive jobs which must be done at a factory. The wing construction is distinguished by its rigidity and accessibility. Outer panels of the wing are provided with a removable panel in the bottom surface. A smooth outer cover of Alclad sheet is attached to longitudinal corrugations which run the entire length of the wing and connect to sheer beams at the leading and trailing edges. The corrugated sheet takes the shear and bending loads on the wing. The bottom covering of the wing is composed of flat sheet reinforced with U-section stringers. Ailerons are statically balanced about their hinge



Outline drawings and views of the nine-place Model V-1 transport axes in order to prevent aileron flutter at high speeds.

The following performance figures are less two-way radio and two three-minute night-landing flares, but with radio mounting brackets and controls. Add 170 pounds for radio and 40 pounds for the two flares.

The following list is a summary of the specifications, loads and performances of the Model V-1 transport.

Dimensions

Span	48 feet
Length overall	35 feet 6 inches
Height overall	9 feet 3 inches
Root chord	11 feet
Tip chord	5 feet
Mean chord	8 feet
Dihedral (top of wing)	3 degrees
Wheel tread	10 feet 2 inches

Areas (square feet)

Wing (including ailerons)	361.5
Ailerons	39.8
Stabilizer	38.6
Elevators (including flap)	32.5
Fin	9.9
Rudder	14.1
Elevator flap	2.4

Weights (pounds)

Weight empty	4,275
Gasoline (148 gallons)	888
Oil	82
Pilot	170
Weight of eight passengers	1,360
Weight of baggage and mail	475
Pay load	7,250

Performances

High speed	225 miles per hour
Cruising speed	195 miles per hour
Landing speed	65 miles per hour
Climb at sea level	1,000 feet per minute
Absolute ceiling	25,000 feet
Service ceiling	22,000 feet
Cruising range	750 miles

Retractable landing gear of the V-1 with landing light housed in the wheel well

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C.

Flying craft. Jesse E. Lesh, North Canton, and Joseph W. Hohl, Newark, Ohio. (1,882,387)

Cushioned airplane propeller. Sylvester F. Crumback, Aurora, Ill. (1,882,410)

Airplane construction. Louis Gastwirth, Bronx, N. Y. (1,882,416)

Aviation engine. Clifton R. Roche, Los Angeles, Calif. (1,882,448)

Sky-writing apparatus. John Popoff, New York, N. Y. (1,882,521)

Airplane. Simon Heiden, Detroit, Mich. (1,882,589)

Airplane service dolly. Ira A. Weaver and William A. Ross, Springfield, Ill. (1,883,156)

Screw propeller for aircraft. Rudolph Chillingworth, Leytonstone, England. (1,883,336)

Variable-pitch propeller. John F. Daugherty, San Diego, Calif. (1,883,340)

Air vehicle. Richard W. Sears, 2nd, and James F. Coca, Woodstock, Ill. (1,883,414)

Method and apparatus for building airship bulkheads. Karl Arnstein and Paul Helma, Akron, Ohio, assignors to Goodyear-Zeppelin Corp. (1,883,455).

Airplane with wing structure and method of making same. Edmond Chagniard and Alexander Kartvelichili, New York, N. Y., assignors to Chagnkart International Aviation Corp. (1,883,552)

Aviation engine. Arthur E. Chevrolet, Indianapolis, Ind., assignor to Chevolair Motors, Inc., same place. (1,883,558)

Airplane. Robert E. Irwin, Barona, Alberta, Canada. (1,883,740)

Light metallic truss structure airfoil. Earl J. W. Ragsdale, Norristown, Pa., assignor to Edward G. Budd Mfg. Co. (1,884,221)

Hydroairplane. William G. G. Weidinger, Chicago, Ill. (1,884,435)

Aircraft and method of operating same, sustaining rotor construction for aircraft, rotative sustaining blades for aircraft, and aircraft having rotative wings. Juan de la Cierva, Madrid, Spain, assignor to Autogiro Co. of America, Philadelphia, Pa. (1,884,596-1,884,599)

Aircraft. Clinton W. Howard, Ohio. (1,884,701)

Aircraft. Joseph F. Hughes and John M. Smith, Smackover, Ark. (1,884,706)

Collapsible boat. William L. McGrath, Elmira, N. Y., assignor to Bendix Aviation Corp. (1,884,792)

Aircraft and aircraft devices. Harold F. Pitcairn, Bryn Athyn, Pa., assignor to Autogiro Co. of America. (1,884,847-1,884,849)

Method of making propeller blades and propeller-blade adjusting means. John Squires, Hagerstown, Md. (1,884,903 and 1,884,904)

Aircraft sustaining rotor and method of making. Paul H. Stanley, Glenside, Pa., assignor to Autogiro Co. of America. (1,884,905)

Ornithopter. Charles W. Strobell, San Diego, Calif. (1,884,909)

Aircraft. Berndt J. E. Krook, Stockholm, and Johannes Harden, Lidingo, Sweden. (1,884,970)

Propeller. Morris J. Stone, Wichita, Kans. (1,884,984)

Airplane. James M. Tuten, Hopedale, Mass. (1,885,392)

Propeller. John Squires, Detroit, Mich. (1,885,487)

Aircraft. Solomon L. Van Meter, Jr., Washington, D. C. (1,885,570)

Airplane. Brayton F. Wilson, Cambridge, Mass. (1,885,571)

Apparatus for use in controlling aircraft. Johann M. Boykow, Berlin-Lichterfelde-West, Germany. (1,885,578)

Shutter wing for airships. Frederic C. Krummel, Bridgewaters, N. Y. (1,885,733)

Pick-up and release device for aircraft. George A. Ricks, Lafayette, Ind. (1,885,765)

Safety frame for airplanes. Gabriel Wolf, Bratislava, Czechoslovakia. (1,885,881)

Aircraft landing float. Harry L. Beam, Otter, Mont. (1,885,889)

Radius forming fixture. Mearl J. Chapman, Cleveland, Ohio, assignor to Great Lakes Aircraft Corp. (1,886,082)

Airplane signal. Milos Krajac, Detroit, Mich. (1,886,245)

Automatic safety landing reversing propeller. Richard C. Wilson, Miami, Fla. (1,886,278)

Variable-camber propeller. Arthur E. Miller, Sacramento, and Hervey M. Salisbury, Walnut Grove, Calif. (1,886,289)

Safety engine for aircraft. Edward Carlson, Tombstone, Ariz. (1,886,327)

Induction compass. Ross Gunn, Washington, D. C. (1,886,336)

Construction of flexible airplane wings having a variable profile. Ugo Antoni, London, England. (1,886,362)

Airplane construction. Abelino Gonsalves, Newark, N. J. (1,886,478)

Variable-pitch propeller. Samuel B. Smith, Rocky River, Ohio. (1,886,602)

Airplane attachment. John Grobling, Detroit, Mich. (1,886,673)

Fastening device for airplane wing covers. Roscoe I. Markey, Nassau County, N. Y., assignor to Aviation Patent & Research Corp. (1,886,708)

Suspension apparatus for airplanes and other vehicles. George L. J. Messier, Montrouge, France. (1,886,712)

Propeller. Frederick J. Martens and Clinton O. Thompson, Milwaukee, Wis. (1,886,891)

Airplane. Ivan Andersson, East Hartford, Conn. (1,886,932)

Propeller for aircraft. Alexander Altieri, Philadelphia, Pa. (1,887,004)

Guiding means for parachutes. Albert A. Longaker, Trenton, N. J. (1,887,030)

Propeller. August Schwarz, Chicago, Ill. (1,887,045)

Propeller and engine jointly for airplanes. Robert Yates, Passaic, N. J. (1, 887,053)

Adjustable propeller. De Witt C. Conklin, Long Island, N. Y. (1,887,146)

Airplane propulsion. Carl de Ganahl, Garden City, N. Y. (1,887,148)

Automatic pilot for aircraft. Lawrence B. Sperry, Garden City, N. Y. (1,887,-335)

Retractable landing gear. Grover Loening, New York, N. Y., assignor to Grover Loening Aircraft Co., Garden City, N. Y. (1,887,357)

Aircraft construction. Richard B. Johnson, Chicago, Ill. (1,887,411)

Propeller construction. Joe W. Price, Canon, Colo. (1,887,429)

Appliance for airplane-launching tracks. Ernst Heinkel, Warnemunde, Germany. (1,887,509)

Airplane-launching track. Wilhelm Stein, Karlsruhe, Germany. (1,887,528)

Variable-pitch propeller. Roland Chilton, Keyport, N. J., assignor to Aeromarine Plane & Motor Co. (1,887,543)

Airplane brake and brake-cylinder device. Sidney G. Down, Edgewood, Pa., assignor to Westinghouse Air Brake Co. (1,887,583-1,887,585)

Airplane wing structures of metal and non-metallic materials. Salo C. Finger, Far Rockaway, N. Y. (1,887,627)

Airplane construction. Joseph S. Brylka, Du Bois, Pa. (1,887,676)

Helicopter. Sidney P. Vaughn, Ackerman, Miss. (1,887,703)

Airplane. Harry G. Smith, Dearborn, Mich. (1,887,738)

Method of launching aircraft. Wilfrid V. N. Powelson, New York, N. Y., and Warren Travell, San Bernardino, Calif. (1,887,860)

Airplane course corrector. Howard D. Allen, Los Angeles, Calif. (1,888,206)

Amphibion airplane. Tom Towle, Detroit, Mich., assignor to Towle Aircraft Co. (1,888,335)

Aircraft. George Clark, St. Boniface, Manitoba, Canada. (1,888,452)

Propeller hub. Thomas A. Dicks, Pittsburgh, Pa., assignor to Pittsburgh Screw & Bolt Corp. (1,888,493)

Shock-absorbing strut for airplanes. John F. Wallace, Shaker Heights, Ohio, assignor to Cleveland Pneumatic Tool Co. (1,888,578)

HAMMOND BIPLANE

THE Hammond airplane, produced by the Hammond Aircraft Corp. of Ann Arbor, Mich., was developed from a previously proved and popular design. It has been flown under all temperature and air conditions and has landed on many types of fields in various ground conditions. Tests also have included the pilotage by inexperienced as well as seasoned fliers. During the course of testing, about 200 pilots flew the ship in different parts of the country. Their suggestions were heeded and many incorporated in the design.

Only after long experimenting and close cooperation of pilot and engineer were the final flying characteristics of the Hammond airplane obtained. The result is a nice-handling ship with inherent stability above the average. Control surfaces are large and so designed and placed that there is a positive action on controls at speeds below the stalling speed of the ship.

The Hammond will not inadvertently fall out of control from any normal flying attitude. However, the ship can be spun deliberately, but upon releasing the controls spinning will cease.

The ship carries a landing gear of 100-inch wheel spread with large oleo-type shock struts and semi-air wheels with brakes. This landing gear and its arrangement also make it virtually impossible to dig a wing tip or ground loop on misjudged landings, and with such a wheel spread, cross-wind landings and taxying present no hazards. Due to the large shock-absorbing capacity provided in the landing chassis, the landing and taxying shocks transmitted to the rest of the structure are relatively small, even on rough ground.

The rigidity of construction carried throughout the ship produces engine smoothness and freedom from vibration which reduces vibrational wear to a minimum, especially around the engine and engine cowling.

The rudder and elevator are actuated by cables which may be easily adjusted. The push-pull tube aileron system is equipped with bushings which require no attention, other than greasing, throughout the life of the ship.

Major revenue sources for an operator of this type ship are student instruction, passenger carrying and taxi work, for which the Hammond is well suited. Equipped with easily removable dual controls, it is particularly adapted for student instruction. The ease and action of the controls give the student the feel of the ship almost instinctively and appreciably reduce the usual dual instruction period.

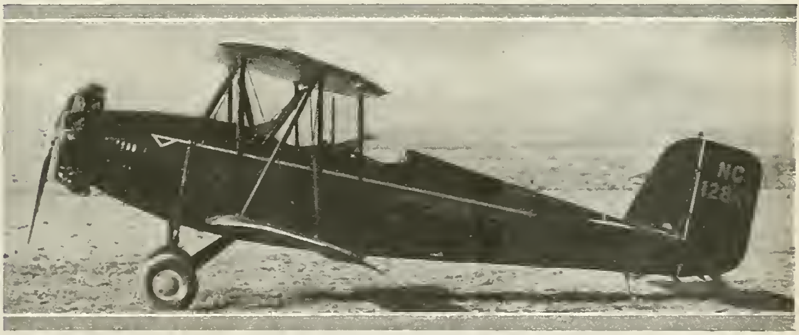
The large baggage space (six cubic feet) and weight allowance (42 pounds) enable an operator to make a cross-country taxi trip, carrying two pay passengers and their baggage.

The economy of operation of the 100-h.p. Kinner engine is outstanding. The actual fuel consumption at cruising speed is 6½ gallons per hour.

The features that make a ship desirable for the operator, such as low operating cost and initial cost, safety, performance and ease of flying, also make it desirable for the private owner. The large luggage compartment, which will accommodate fishing tackle, golf clubs, bags or even a suit of clothes on a hanger, is valuable for use by the sportsman pilot.

Specifications

Length overall	23 feet 6 inches
Height overall	9 feet 2 inches
Span, upper wing	30 feet 1 inch
Span, lower wing	28 feet 8 inches
Chord (both wings)	63.5 inches
Wing area (including ailerons)	290 sq. feet
Weight, empty	1,250 pounds
Useful load	760 pounds
Gross weight	2,010 pounds
Actual pay load	382 pounds
Fuel	30 gallons
Oil	3.5 gallons
Cruising speed at 1,750 r.p.m.	90 m.p.h.
High speed	108 miles per hour
Landing speed	36 miles per hour
Climb	600 feet per minute
Cruising range	400 miles



Side view of the two-place 100 horsepower Kinner-engined Hammond biplane

BOEING TRANSPORT

THE first of sixty twin-engined Boeing transports being built for United Air Lines and the general market took to the air at Seattle, Wash., in February. Flight tests disclosed a performance which ranks the plane as the fastest multi-motored commercial transport. Into the new transport has gone the experience gained by the Boeing Airplane Co. in 16 years of producing aircraft, and by the United Air Lines in operating transport planes for more than fifty million miles; officials of both companies collaborated in its development. Indicative of the high strength factors, the wing is designed to withstand a load of 36½ tons, and the landing gear a load of 32¼ tons. In static tests the requirements of the Department of Commerce were surpassed, permitting an increase over the pay load for which the plane first was designed.

As the new planes are completed, they will be placed in service by United Air Lines. Their speed will permit reduction of coast-to-coast travel time to less than 24 hours and will make possible proportionate reductions on the company's other routes. The cruising range will permit flights between the Pacific and Atlantic seaboards with only seven stops, compared to the present 14. The production schedule calls for 18 of the planes to be delivered for service by the first of May.

Features making for operating economy include the high speed and extended cruising range with low fuel consumption, all-metal construction necessitating a minimum maintenance, easy maintenance and inspection. For months prior to production, the company "tooled up" for the project. As a result, such items as wing and body sections, tail surfaces, landing gear, floors, doors, windows, engine mounts, etc., of one plane are interchangeable with similar parts of any other plane of the fleet being produced.

Among the features designed for the passengers' comfort are a system for heating or cooling the cabin, upholstered extra-size chairs with reclining backs, main and individual reading lamps, a six-foot interior cabin height and cabin insulation against noise and temperature conditions. Chairs are 20 inches wide between the arms and are spaced 40 inches apart.

The wall consists of the outside metal skin, a half-inch air space, a layer of felt, a sheet of plywood and a layer of felted fabric as the interior finish. This latter minimizes "reflected" sound. The location of the engines forward of the leading edge of the wing without direct connection to the body results in a reduction in noise and vibration.

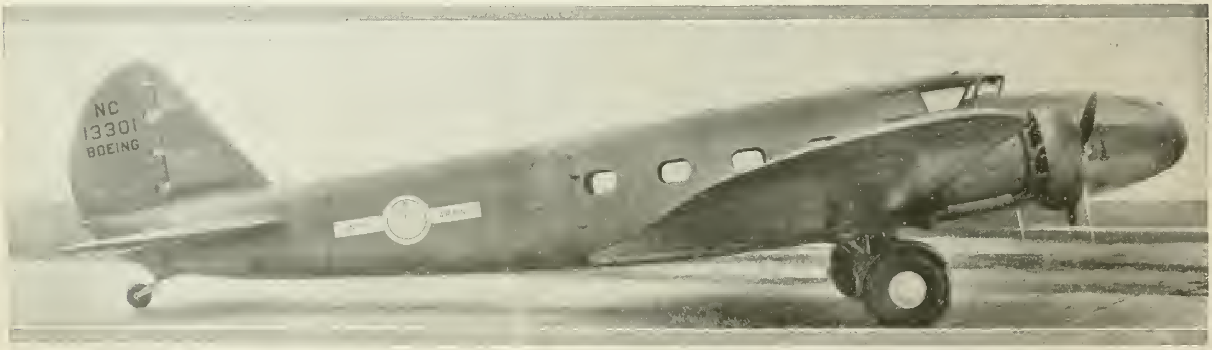
The heating-cooling system consists of a boiler built around one exhaust stack, radiators, blower fans and air scoops. Air entering the plane through the scoops is heated as it passes over the radiators, or is cooled if the boiler is automatically disconnected from the exhaust. The system is thermostatically controlled to maintain a cabin temperature of about 70 degrees. Approximately 18,000 cubic feet of air enters the cabin every hour. Two air outlets are provided in the ceiling. Supplementing the main ventilating system are individual air intakes at each window which are adjustable.

The cabin is harmoniously decorated as well as comfortable, with fixtures of statuary bronze, green whipcord chair upholstery and green fabric wall lining. The silver gray of the plane's exterior is the natural color of anodically treated duralumin with no pigment finish.

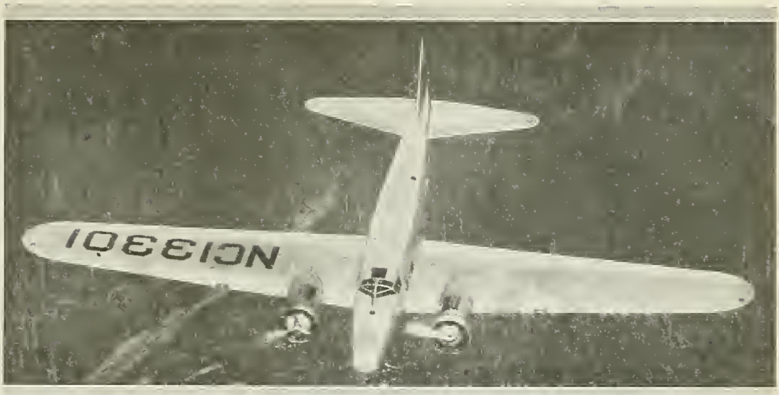
In the forward part of the fuselage is a 60-cubic-foot mail pit, accessible by a hinged door in the nose. Behind this is a compartment containing the two receivers and transmitter of the plane's Western Electric two-way radio telephone equipment. Then come the pilots' compartment, the passenger cabin, 20 feet long and 6 feet high, accessible by a door in the right side of the fuselage; a lavatory, and, in the rear, a 65-cubic-foot mail, baggage-and-express compartment, which is reached through a door on the left side of the fuselage. Sacks and packages may be loaded and unloaded without interfering with passengers.

In the pilots' compartment are a main instrument board with 35 devices to assist in the plane's operation and navigation, a sub-panel and dual controls. Pioneer instruments are used extensively. The first pilot's seat is adjustable.

Included in the navigation and engine



The new Boeing model 247 transport powered with two supercharged Pratt & Whitney 550 h.p. engines



The first of the new Boeing transports seen from above in flight

aids are sets of instruments whose functions are duplicated—the directional gyro and compass, sensitive altimeter which indicates elevation in hundreds as well as thousands of feet, rate-of-climb indicator, turn-and-bank indicator and Sperry artificial horizon.

Among other instruments and devices are the air speed indicator, clock, landing gear position indicator, outside air temperature gauge, engine cylinder temperature gauge, multi-point selector switch for cylinder temperature readings, two hydrostatic fuel gauge dials, dual engine primer, parking brake lever, switches, controls, lights and electrical units, fuel pressure gauges, oil pressure gauges, oil temperature gauges, electric tachometers and an ammeter.

An engine-driven vacuum pump supplies the vacuum-operated instruments, to avoid the drag of the venturis and because venturis might become ice-clogged. To eliminate the possibility of a landing with the landing gear unintentionally in retracted position, three sets of warning devices are provided: the landing gear position indicator, two red bullseye lights which flash from the instrument board, and a Klaxon horn which actuates if the throttle is closed while the gear is up. Standard night flying equipment includes navigation lights, landing lights in the leading edge of the wing and parachute flares.

Duralumin is the chief metal used in the semi-monocoque type fuselage, which is composed of dural bulkheads, longerons of heavy dural channel section, skin stiffeners of light gauge, a small channel section and smooth skin dural covering. About 500 square feet of Haskelite plywood is used throughout the construction of each ship.

The wing consists of a center section, two outboard panels and two removable wing tips, with the outboard panels bolted to the wing stubs. The cantilever type wing structure is entirely of metal, having spar trusses of square and rectangular aluminum alloy tubing and a covering of smooth aluminum alloy sheet. The trailing edge of the wing and the leading edge of the wing stubs are removable to facilitate repairs.

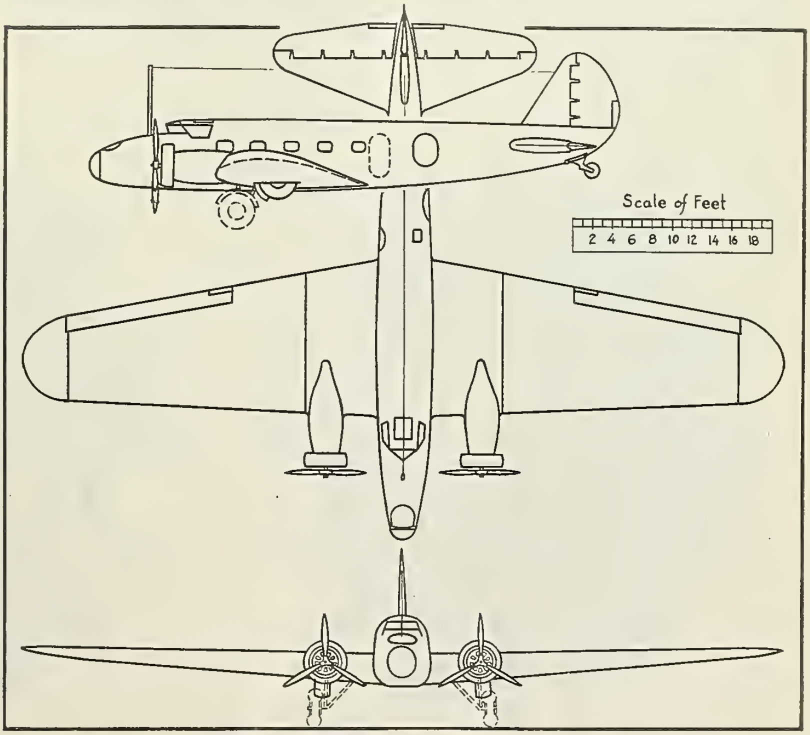
Tail surfaces are of the cantilever type, with channel-section spars and ribs and smooth metal skin covering. Trailing edge flaps are incorporated in the elevators and rudder to permit trimming the plane in flight for different load conditions and for compensating for unbalanced propeller thrust. The non-adjustable stabilizer is fixed to give proper balance at cruising speed with full load.

The landing gear is of the divided type, with Boeing oleo shock absorbers and hydraulic brakes. The latter are operative individually or simultaneously and may be locked for parking by means of a hand-operated ratchet. The Goodrich main tires, although having a tread of 15 inches, each require a pressure of only 25 pounds of air, while the tail wheel tire, with its seven-inch tread, requires 30 pounds. The landing gear, operated electrically with an auxiliary manual control, retracts into the wing stubs. It takes 16 seconds to retract the gear and less than 20 seconds to return it to landing position. The full-swiveling tail wheel is equipped with an oleo shock absorber.

Tankage for a total supply of 271 gallons of gasoline is provided by two tanks located in the wing stubs.

Nacelles for the two engines are bolted to the wing structure. Boeing ring cowls and Hamilton Standard three-bladed propellers are used.

Specifications	
Wing Span	74 feet
Wing area	836.13 square feet
Stabilizer area	73.8 square feet
Elevator area	58.9 square feet
Fin area	17.6 square feet
Rudder area	24.1 square feet
Aileron area	62.6 square feet
Length overall	51 feet 4 inches
Top speed at 5,000 feet	182 m.p.h.
Cruising speed at 5,000 feet	165 m.p.h.
Landing speed	58 miles per hour
Take-off run	770 feet
Initial rate of climb	830 ft. per minute
Climb in 10 minutes	8,000 feet
Service ceiling	18,400 feet
Absolute ceiling	20,500 feet
Cruising range	730 miles



Outline drawings showing the general arrangement of the Boeing transport

PRATT & WHITNEY'S DEVELOPMENT OF TWO-ROW RADIAL ENGINES

As a result of an extensive development program carried on with the cooperation of the U. S. Navy Bureau of Aeronautics and the U. S. Army Air Corps, the Pratt & Whitney Aircraft Co. of Hartford, Conn., has completed official tests on two sizes of 14-cylinder, two-row, geared and supercharged, air-cooled engines, the Twin Wasp Junior and the Twin Wasp. These have been awarded Approved Type Certificates No. 95 and No. 96, respectively.

The Twin Wasp Junior is rated by the manufacturer at 700 horsepower at 2,500 r.p.m., maintained to 8,000 feet by supercharging. The average power developed during the test was 725 h.p. at the rated speed; average fuel and oil consumptions were .55 and .019 lb. per brake horsepower hour respectively. In the cruising range, specific fuel consumptions of .44 lb. per h.p. hour have been consistently recorded and, allowing for the most adverse conditions of service, the average cruising consumption should not exceed .46 lb per h.p. hour.

The larger engine, the Twin Wasp, is the most powerful American production air-cooled engine today. It is rated by the manufacturer at 800 h.p. at 2,400 r.p.m., maintained to 4,500 feet by supercharging. Average power developed on the 100-hour test was 830 h.p. Average fuel consumption during the test was .55 lb. per h.p. hour and the oil consumption was .027 lb. per h.p. hour. As in the smaller two-row model, good economy is obtained in the cruising fuel consumption.

An outstanding feature of both engines is the cylinder shrouding or baffling, which is furnished complete as part of the engine. It has been designed and tested to give maximum cylinder cooling and to provide for minimum drag when used with high-speed cowling.

The construction of a two-row engine of approximately 2,300 cu. in. was started in the fall of 1929. This engine had two rows of seven cylinders each and was fitted with a 2:1 propeller reduction gear. During 1930 this engine was thoroughly tested on the dynamometer and torque stand, after which it was given extensive flight tests.

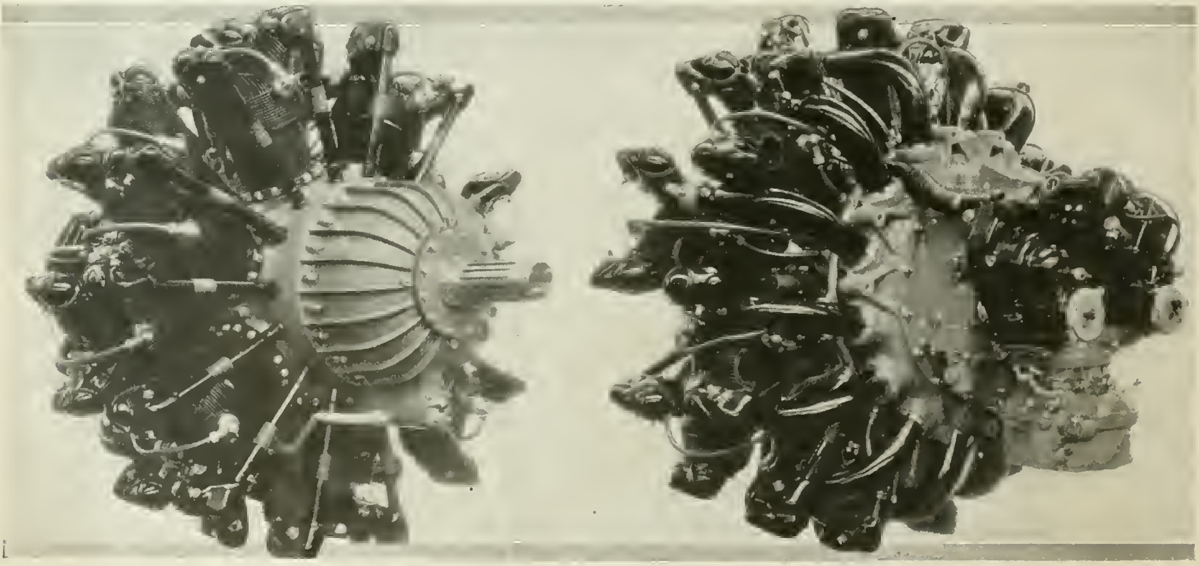
The Research Division of United Aircraft & Transport Corporation made an investigation of the relative drags of different types of engines. To supplement the data in this field available from other sources, a series of wind-tunnel tests was made on quarter-scale models of single- and two-row engines of several sizes. These studies and the results of the actual operation of the 2,300-cu. in. engine showed this type was capable of considerably greater power outputs than the single-row and that this higher power could be had with the added merits of smoother running, smaller drag in proportion to power, and smaller diameter, with consequent improvement in vision for the pilot.

Essentially, the two-row type uses a greater number of smaller cylinders than the single-row. Due to this and the resulting reduced reciprocating weights, it is possible to operate two-row engines at much higher crank speeds.

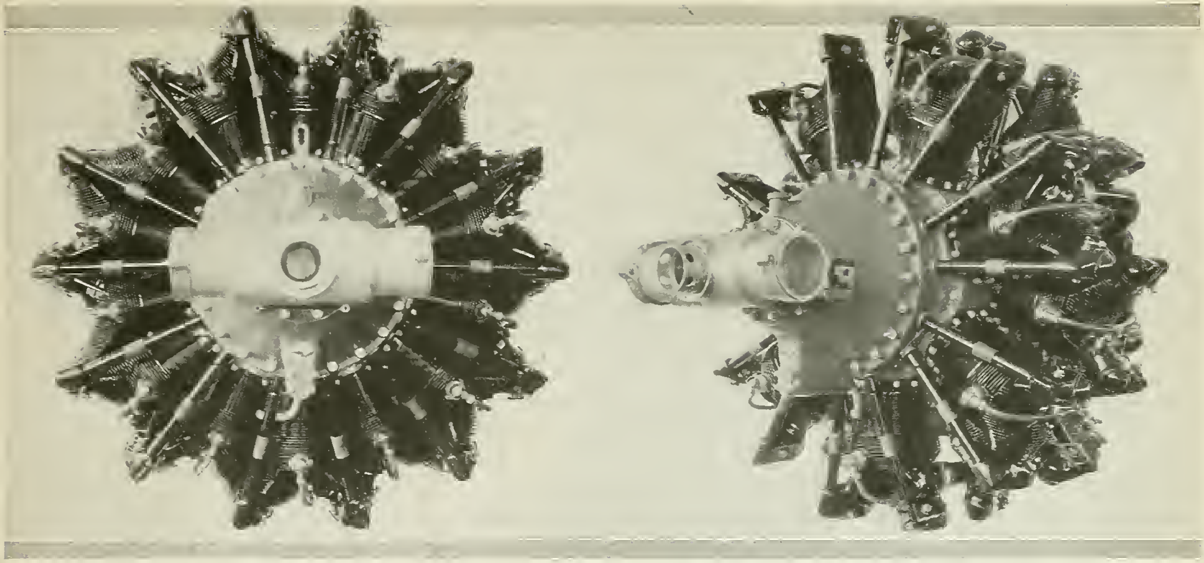
High crank speeds and large powers make it desirable to use reduction gearing to obtain the best propeller efficiencies. A study was made of propeller conditions in airplanes for which the two-row engines were adapted, and this study led to a choice of gear ratios making possible good efficiences with propellers of reasonable diameters and weights. Subsequent flight testing has not only confirmed the expectations of airplane performance and fuel consumptions with the geared engines, but also has shown that the relatively low tip-speeds of the geared propellers make them quieter than direct-drive propellers. These considerations resulted in a decision to offer only geared models of the two-row engines.

By the end of 1930 it was obvious that the powers which could have been expected from a further development of the 2,300-cu. in. engines were greater than those for which there were any immediate requirements. Rather than continue this development, the company undertook the development of an 1,830-cu. in. engine, the Twin Wasp, incorporating in its design the results of experience from the tests of the larger model. Since early in 1931 these engines have been running, not only for hundreds of hours of block testing, but also for long periods in flight.

It was decided that in addition to the



The most recent type Pratt & Whitney "Twin Wasp Junior" rated at 700 horsepower at 2500 r.p.m.



The new Pratt & Whitney "Twin Wasp" rated at 800 horsepower at 2400 r.p.m.

Twin Wasp, a smaller engine was desirable for the immediate projects in hand, and in the early part of 1931 the company began development of a smaller two-row engine. Experimental engines of this type (since announced as the Twin Wasp Junior) were running in the fall of 1931. This smaller engine also has had many hours of continuous testing on the block and in the air. A number of engines of each model have been delivered and are now in flight service.

A general description of one model of these two engines will serve for both, as the design of each is substantially the same.

The power section is built around a balanced, two-throw crankshaft. The main crankcase, of aluminum alloy, is made in three sections and is split on the center line of each row of cylinders. The shaft is carried on three anti-friction bearings, one in each section of the case. Each crankpin carries a master connecting rod and six link rods. Each master rod is fitted with steel-backed lead-bronze bearings. The link rods are secured to the master rod in the conventional manner and are lubricated under pressure at their inner ends. All rods are of I section, finished and polished all over. This construction provides for complete inspection of all surfaces. All rods are made of chrome-nickel-steel forgings. The pistons are of the forged ribbed type designed for maximum dissipation of heat and provided with three compression rings and one scraper ring per piston. They are secured to the connecting rods by full-floating piston pins.

Front and rear crankcase sections are provided with extensions which directly support the cams and valve tappets on either end. Cams are simple in construction, designed so that the gears may be ground for accuracy of manufacture. The cams are driven by spur reduction gears directly from the crankshaft, these gears supported by bearings on either end. Valve tappets are carried in the same member as the cams. It is possible to assemble the entire power section and time the valves while the cams and tappets are still exposed to view. Tappets are easily removable without disturbing the tappet guides.

Cylinders are of composite construction, the barrel portion being machined from steel forgings and having finely spaced cooling fins. The cylinder heads are of aluminum-alloy castings, screwed and shrunk on the barrels. Rocker boxes are cast integral with the heads. Care has been taken literally to wash with cooling air all the heated portions of the head. Exhaust ports provide maximum cooling and ease of connection to the exhaust manifold. Much finer finning than that usually employed is used both on the head and barrel thus providing for adequate radiating surface. Exhaust valves are of the internally cooled type. The valve seats are of aluminum-bronze forgings shrunk into the heads. Valve rockers are mounted on anti-friction bearings designed for maximum life at higher speeds. The adjusting screws are much stronger than those used formerly in the single-row engines. Push rods are short and made of heat-treated aluminum alloy tubing fitted with hard steel ball ends. The entire valve gearing is completely enclosed, and provision is made, by internally drilled passages, for easy lubrication of both ends of the push rods and rocker arms, as well as of the rocker bearings. Valves for front and rear cylinders are operated from the front and rear of the main power section respectively, and therefore the push rods are almost parallel with the cylinder axis.

The rear section is comprised of two major castings—the blower section, which provides the blower ring and 14 separate outlets to which the cylinders are connected, and the rearmost casting, which forms the supercharger diffuser section and carburetor inlet elbow, as well as the support for all accessories. On this casting are mounted an Eclipse starter, a Stromberg double-barrel carburetor, two 14-cylinder type Scintilla magnetos, oil pumps, oil strainer, fuel pump, two gun-synchronizer drives, two tachometer drives and the generator drive. Provision also is made for mounting and driving a vacuum pump, providing the necessary suction for the operation of certain flight instruments and also a pressure unit, if necessary, for the operation of others, including "ice overshoes."

The rear-section assembly is similar in design to the rear end used on the single-row models and has built into it a General Electric centrifugal-type supercharger. A clutch is provided in the supercharger drive train for reducing the stress on these gears. Eight engine mounting supports are provided on the blower section, in combination with the blower outlets. The carburetor elbow and entrance to the supercharger impeller provide for uniform distribution of air and liquid entering the impeller. Because of this feature the engine idles and runs smoothly over its entire range of operating speed. The rear assembly is compact, the various accessories grouped to be accessible and to present a clean, balanced appearance. Intake pipes having special flexible joints connect the blower outlets with the individual cylinders. A neat arrangement of Breeze shielding is provided for all ignition wiring. There are two spark plugs per cylinder, located in a fore-and-aft plane.

The nose section of the crankcase encloses a spur planetary type of propeller reduction gear so designed that all teeth may be ground. A bell gear is attached to the forward end of the crankshaft by means of splines. The hub of this gear is supported by a roller bearing carried in an aluminum diaphragm mounted on the front section of the crankcase. Six planetary pinions mesh both with the bell gear and with a fixed or sun gear carried in the nose section of the crankcase. These planetary gears are carried in a forged steel cage splined directly to the propeller shaft. Provision is made for equalizing the load on all reduction gear pinions. This is accomplished by a method of mounting the pinions and their needle bearings on eccentric shafts and linking all the shafts together in a manner which provides accurate distribution of the driving loads on all of them. The propeller shaft is a nickle-steel forging. It is carried on two bearings spaced well apart in order to provide ample support for the propeller. The forward bearing, located just behind the propeller hub and carried in the nose section, is of the anti-friction type taking both radial and thrust loads. The rear end of the propeller shaft is carried by a plain bearing mounted inside the forward end of the crankshaft. Means are provided for pressure-lubricating all bearing surfaces. Due to the various special features of construction, the mechanical efficiency of these gears is high, the friction losses being almost negligible.

The nose section housing is made of heat-treated aluminum alloy. It is constructed with an oil sump integrally cast and so arranged that the engine will properly scavenge during a steep dive. A short intermediate piece closes the rear end of the front section, bolting between it and the main crankcase.

Pressure lubrication is provided for all bearings, except the rocker arms, which are equipped with Zerk fittings. In addition to the sump on the front section, another sump is attached to the main and rear sections. Oil from the supply tank passes through the pressure pump and thence through a fine-mesh strainer, accessibly located in the rear section. The oil is then carried into the crankshaft and distributed to the crankpins and rods, reduction gear, cams, cam drives and other moving parts. Oil under pressure also is supplied to the accessory and supercharger drives. An oil by-pass relief valve is provided and so arranged that the relief discharge need not necessarily be returned to the tank but may be recirculated to the suction side of the pressure pump.

Two oil-scavenging pumps drain the oil from their respective sumps and deliver it to the oil supply tank through an oil cooler.

The two banks of cylinders have independent valve-operating mechanisms and two distinct and separate sources of ignition.

The exhaust system ordinarily used consists of a collector ring carried on the engine mounting. Each cylinder exhausts into this ring through a separate short pipe. To combine adequate cooling with minimum drag, the system of baffles around the cylinders limits the flow of air past the engine and directs that air so that it is more effective in removing heat. These baffles are supported on the engine and are removable without disturbing other parts. The baffling system includes a ring around the engine between the front and rear rows of cylinder; this serves also as a convenient support for the outer cowl. This outer cowl must, of course, be adapted not only to the engine but also to the fuselage or nacelle in which it is installed.

Both engines are fitted with a special valve and oil transfer bearings located in the front section immediately behind the thrust bearing for the purpose of supplying oil for the Hamilton Standard hydraulically-operated controllable-pitch propeller, which was described in the March issue of AERO DIGEST. This feature, built into all engines, provides for the use of a Hamilton Standard controllable-pitch propeller at any time without structural change to the engines.

With the release of these engines for domestic commercial use, plans have been made for their installation in numerous new designs of commercial airplanes.

The following are the manufacturer's specifications of the two engines:

Twin Wasp

Rating at 4,500 ft.	800 h.p. at 2400 r.p.m.
Displacement	1,830 cubic inches
Weight (dry)	1,125 pounds
Diameter	47⅞ inches
Fuel consumption (cruising)	.46 lb. h.p.hr.
Oil consumption (cruising)	.020 lb. h.p.hr.
Propeller reduction gear ratio	3:2

Twin Wasp Junior

Rating at 8,000 ft.	700 h.p. at 2500 r.p.m.
Displacement	1,535 cubic inches
Weight (dry)	975 pounds
Diameter	43⅞ inches
Fuel consumption (cruising)	.46 lb. h.p.hr.
Oil consumption (cruising)	.020 lb. h.p.hr.
Propeller reduction gear ratio	4:3

Digest of Technical Articles from Foreign Publications

By Elsa Gardner

HEAT TRANSFER IN ENGINES

A Study of the Transfer of Heat to Cooling Water in an Aviation Engine. Application to the Comparison of Fuels. Measurements of Detonation (Etude sur la transmission de la chaleur à l'eau de refroidissement dans un moteur d'aviation. Application a la comparaison des carburants. Measures sur la detonation). N. Champsaur. Publications Scientifiques et Techniques du Ministére de L'Air. No. 17, 1932, 91 pp., 25 figs.

A NEW METHOD explained in this report deals with the measurement of heat on the walls of the combustion chamber of aircraft engines, and was developed at the Chalais-Meudon Engine Test Station. The research described is not limited to a comparison of fuels and to measurements of detonation, but also gives a complete study of the transfer of heat to the cooling water of an engine. The author takes up particularly the variation of the thermal characteristics of the engine with torque, r.p.m., temperature of inlet air, richness of mixture, ignition advance and nature of the cooling liquid.

PERFORMANCE CALCULATION

The Estimation of Performance. R. M. Clarkson. Aircraft Engineering, Vol. 5, Nos. 47 and 48, January and February, 1933, pp. 3-5 and 37-40, 8 figs.

A PRACTICAL METHOD is described which is employed by the De Havilland Aircraft Co. for estimating the performance of an airplane. The chief point of difference lies in the substitution of the more fundamental quantities, equivalent monoplane span and span loading for the more familiar wing surface and wing loading as a consequence of the importance attached to induced drag.

These articles are the first two instalments of a series of five, the first dealing with basic assumptions and general expressions for horsepower available and horsepower required curves. In Part II general curves are evolved for absolute ceiling, service ceiling, initial rate of climb, time to climb any altitude, maximum angle of climb at sea level, maximum speed at sea level and at altitude, and optimum A.S.I.'s for best rate and angle of climb, all in terms of power loading, span loading, maximum propeller efficiency and maximum L/D. Effects of variations in propeller conditions also are examined. In Part III the author expects to take up a particular phase of performance estimation not dealt with hitherto and in Part IV will give an approximate method of estimation involving only power and span loading. Part V will be devoted to take-off and "screen," which are covered entirely separately from other performance calculations.

BRITISH AERONAUTICAL PROGRESS

Aeronautics in 1932. Engineer, Vol. 155, No. 4017, January 6, 1933, pp. 2-4, 2 figs.

DEVELOPMENT of the British aircraft and engine industry during the past year is traced with particular reference to the principal work carried out by Boulton and Paul, Spartan Aircraft, Cierva Autogiro Co., Short Brothers, Bristol Aeroplane Co., Blackburn Aeroplane Co., Westland Aircraft Works, Fairey Aviation Co., Vickers Aviation, Saunders Roe, Gloster Aircraft Co., Armstrong-Whitworth Aircraft, Armstrong-Siddeley Motors and Rolls Royce. Relatively to most other engineering branches, the British aero industry was said to be in general happily circumstanced during 1932. Due to prestige received from the Schneider Trophy Contest, valuable orders were received from foreign countries and there was little foreign competition at home. Two main features are disturbing to the outlook of the industry, however; namely, the rigid economy required by the Air Ministry, which reduced encouragement to new designs, and the political issue, its question of disarmament and the prohibition of heavy bombing machines.

AIR COOLING FOR ENGINES

The Theory and Practise of Air Cooling. D. R. Pye. Aircraft Engineering, Vol. 5, No. 48, February, 1933, pp. 31-33.

THIS is the first of a series of articles which may be considered a continuation of the author's book, "The Internal Combustion Engine." It is a correlation of the engineers' problem of designing an adequately cooled aircraft engine cylinder with the theoretical and experimental researches on the boundary layer, and laminar flow within it, which start with Blasius' development of the Lanchester-Prandtl theory and end with the experimental measurements of the velocity and temperature gradients in an air stream very close to a hot surface. The author also includes a mathematical treatment of the cooling efficiency of fins, from which conclusions of direct practical importance may be drawn.

WINGED FLIGHT

Wing Beats III, J. D. Batten. Royal Aeronautical Society Journal, Vol. 37, No. 266, February, 1933, pp. 168-176, 8 figs.

THE PROBLEM of human flight is taken up with an analysis of the flight of birds, and the author's contribution to the problem is the suggestion that the counterpart of such postural muscular function might, to a large extent, be fulfilled by an artificial appliance, attention being called to the suitability of a torso of natural silk. The latest model of the author's is described, in which a slight repeated upward pull is sufficient to induce and maintain, a constant up-and-down oscillation of the thorax, which expresses itself as a constant beating of the wing spars. The author's first experiments will be directed toward the design of blades of the greatest propulsive aptitude that can be devised to build onto the wing spars, and these will be tested with the speed which a man can attain in traveling along the ground.

This article is preceded by one entitled "How Insects Fly," by R. E. Snodgrass, of the Bureau of Entomology, United States Department of Agriculture.

AIRPLANE TIRES

Aeroplane Covers and Wheels. F. Fellowes. Royal Aeronautical Society Journal, Vol. 37, No. 266, February, 1933, pp. 177-198 and (discussion) pp. 198-203, 24 figs.

MODERN TYPES of airplane tires and wheels are taken up and their comparative values shown. Classifying tires into high-pressure, low-pressure and extra low-pressure ranges, the author discusses their design characteristics, tread pattern, static load-carrying capacities in relation to air pressures, contact areas, coefficient of friction, landing surfaces and angle of stability. He compares the aerodynamic properties of the three types, quoting from the investigations of G. H. Dowty. He refers to a new type of fairing developed by the Dunlop Co. which wind-tunnel tests have proved highly satisfactory, and points out the saving in drag which would result from changing from 4-by-19 high pressure to 7-by-7½ low pressure tires. He touches on the subjects of energy absorption, strength, weights, brakes and the Dunlop method of preventing creep on extra low-pressure tires as compared with the Goodyear method, and concludes with the opinion that the low-pressure or intermediate range of tire is most suitable.

TAIL BUFFETING

Tests for the Elimination of Tail Buffeting (Versuche zur Beseitigung von Leitwerkschnetteln), C. Biechteler. Zeitschrift Fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, No. 1, January 14, 1933, pp. 15-21, 21 figs.

CAUSES of tail buffeting on low-wing monoplanes at high angles of attack were investigated for this report and tests made for its elimination. Tests of the flow of air on the wings of a BFW-M-23b airplane agreed with previous DVL tests on a Junkers F-13. Tail buffeting was attributed to disturbances of flow over the wing near the fuselage, changing its course. To eliminate these disturbances, a fairing was fitted for the test airplane which rounded off the angle between the side of the fuselage and top of the wing. This fairing was hard to construct, however, so a second fairing was designed, flight tests with which proved that buffeting of the elevators was eliminated.

Report of the Deutschen Versuchsanstalt fuer Luftfahrt.

This article is followed by one describing the results of wind-tunnel investigations of tail buffeting undertaken by the English.

SPINNING

Airflow about Stalled and Spinning Aeroplanes Shown by Cinematographic Records of the Movements of Wool-Tufts, B. Melvill Jones and J. A. G. Haslam. (British) Aeronautical Research Committee—Reports and Memoranda No. 1494, August, 1932 (issued February 23, 1933), 12 pp., 32 figs.

RESULTS of experiments are discussed in which cinematographic records were made of the movements of a large number of tufts of wool fastened to the fabric of the upper surfaces of the wings and tails of airplanes. The behavior of the tufts gave a definite indication of the dividing line between the stalled and unstalled parts of the wing. On the unstalled part, where the main air stream was flowing directly over the wing surface, they lay parallel to one another, pointing steadily toward the rear. On the stalled part, sometimes the motion of all the tufts appeared irregular, indicating a disorganized type of flow, while at other times all the tufts pointed forward and remained more or less still and parallel to each other, indicating the presence of a large eddy standing stationary above the part of the wing affected with its axis roughly parallel to the leading edge.

ALUMINUM CORROSION

The Behaviour of a Single Crystal of Aluminum Subjected to Stressless Corrosion in a Stream of Tap Water Followed by Test to Destruction, in Air, Under Alternating Torsional Stresses (Specimen No. AL 12B), H. J. Gongh and G. Forrest. (British) Aeronautical Research Committee—Reports and Memoranda No. 1476, June, 1932 (Issued February 23, 1933), 11 pp., 12 figs.

CHANGES in microstructure under corrosion-fatigue and stressless-corrosion conditions were compared for this report. During the stressless-corrosion stage, a general corrosion pitting attack resulted, which attack increased slowly in intensity as the test proceeded. By comparison with observations of the same phenomena under corrosion-fatigue conditions, it was concluded that this general pitting attack was not influenced, to any marked degree, by the absence or presence in the metal of a state of elastic strain due to applied cyclic stresses. The subsequent test to destruction in air showed that the fatigue strength of the crystal had not been influenced, to any appreciable effect, by the corrosion's occurring during the previous stressless-corrosion stage.

PERFORMANCE CALCULATIONS

Calculation of Performance (Calcul des performances), R. Sallè. L'Aéronautique, Vol. 15, No. 165, February, 1933, pp. 9-12.

THIS METHOD of estimating the performance of airplanes is based on the replacement of the polar and propeller curves by parabolic forms which lie in the performance region. Performance calculations for the Dewoitine D-27 airplane are given, and from the polars made up in the laboratory the real polars are deduced. Results of performance tests of the Dewoitine D-27 with a Type 57 Hispano-Suiza engine are included.

AILERON DESIGN

A Design Formula for Ailerons, T. Ogawa. Tokio Imperial University, Aeronautical Research Institute—Report No. 88, Vol. 7, No. 7, November, 1932, pp. 179-194, 7 figs.

IN THIS INVESTIGATION, it was observed that the angular acceleration of the airplane in rolling, when the aileron was actuated with a constant angular velocity, tended to be a constant after a small fraction of a second. Angular acceleration was found to be directly proportional to the aileron form factor, to the angular velocity of the aileron control and to the velocity of flight, but inversely proportional to the length of span. Defining the aileron effectiveness as the constant angular acceleration for a flight of minimum velocity and for an aileron angular velocity of one radian per second, the author calculates the aileron effectiveness for present airplanes, showing the average values are 1.92, 1.57, 0.97 and 0.94 for fighters, light planes, transport planes and observation machines, respectively.

THOMSON EFFECT

Thomson Effect of Crystalline Substances, Y. Endo. Tokio Imperial University, Aeronautical Research Institute—Report No. 85, Vol. 7, No. 4, September, 1932, pp. 115-149, 12 figs.

THE FORMULA for the Thomson effect is obtained from the calculation of the work against the internal balancing electromotive force as well as the energy of electrons dissociated in metal. This formula is applied to the case of Cu, Ag, Au, Al and Pb, compared with Borelius' observed values, and the percentage of dissociated electrons estimated. These values are close to that expected from Richardson's phenomena of thermions. The formula gives the coefficient of the Thomson effect at any temperature. By applying the second law of thermodynamics, the coefficient of the Peltier effect (the heat produced in the junction of two metals with electric current flowing through them) is derived, using the coefficient of the Thomson effect.

BUCKLING SHEARING STRESSES

Buckling Shearing Loads on Rectangular Plates (Ausheul-Schuhlast rechteckiger Platten), E. Seydel. Zeitschrift Fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, No. 3, February 14, 1933, pp. 78-83, 11 figs.

FORMULAS are developed for the calculation of buckling shearing loads on isoptropic or orthogonal anistropic plates, are explained by means of numerical examples and are checked by the results of experiments. It was found that when the plate was so thick that failure occurred if the allowable strength in shear was exceeded, the plate remained straight without buckling. For thinner plates, the loads were comparatively small up to the critical shearing load. Due to buckling, a rapidly increasing bending moment exceeding the critical load led to failure of the plate. In this case the critical load was important for strength. With the very thin plates used in aircraft construction, due to buckling, there were very small bending stresses which, apart from local stresses, remained below the yield point, so that the failure followed according to the Wagner tension diagonal field formation by exceeding the tensile strength. For columns in compression, the second case satisfied Euler's theory of failure through buckling.

Report of the Deutschen Versuchsanstalt Fuer Luftfahrt.

AIRPLANE MAINTENANCE

Maintenance of Metal Air Frames, S. Gordon Young. Hull and Float Maintenance, J. Jarvis. Aircraft Engineering, Vol. 5, Nos. 47 and 48, January and February, 1933, pp. 13 and 16, and 27-30, 12 figs.

POINTS to be watched for by inspectors and ground engineers during the production of metal aircraft structures and after their repair are discussed in the first article. The materials employed are steel, duralumin and aluminum, and such subjects are discussed as care in welding, use of fish plates, fastenings in strip construction, importance of finish, initial protection treatments and protection of tubes.

Notes on the care and repair of timber and metal seaplane hulls and floats are given in the second article. The author explains types of timber, application of planking, protection of metal construction against corrosion, and efficient riveting for watertightness.

SEAPLANE STABILITY

The Stability on the Water of a Seaplane in the Planing Condition, W. G. A. Perring and H. Glauert. (British) Aeronautical Research Committee—Reports and Memoranda No. 1493, September 1932 (Issued February 23, 1933), 60 pp., 6 figs.

PORPOISING of a seaplane when traveling over the surface of the water is analyzed theoretically. General equations for the disturbed motion of a seaplane in its plane of symmetry are given, using fixed axes and ignoring any possible acceleration derivatives, and are then converted to a convenient non-dimensional form. Longitudinal freedom is shown to have practically no effect on the stability, and porpoising may be regarded as an interaction of the vertical and pitching moments. Tests of a bare model without wings and tailplane are shown to be valueless and misleading.

"GRAF ZEPPELIN"

Setting to Work the Technique of the Graf Zeppelin (Mise en oeuvre technique du Graf Zeppelin), C. Dollfus. L'Aéronautique, Vol. 15, Nos. 164 and 165, January and February, 1933, pp. 15-20 and 39-42, 22 figs.

NOTES AND OBSERVATIONS on a voyage of 20,000 kilometers on board the *Graf Zeppelin* in a regular trip from Friedrichshafen to Pernambuco are given. The author describes the control and equipment of the airship and the installations required at both ports for landing and explains the methods of maintenance, the Maybach engines and their use of blaugas and the electric power equipment on the airship. The second instalment of the article the author devotes to solutions to the problems of living so long in the air.

LIGHT TRANSMISSION

On the Transmissibility of the Visible Light through a Cloud of Particles (Part I), D. Nuklyama and A. Kohayasl. Tokio Imperial University, Aeronautical Research Institute—Report No. 82, Vol 7, No. 1, August, 1932, pp. 1-18, 10 figs.

TRANSMISSION of light signals through fog was the problem considered in the reported investigation. The authors studied the coefficients of transmissibility of clouds consisting of water, NH_4Cl, and their mixtures, obtaining results which did not agree with the theory of scattering theoretically deduced by Rayleigh. Results showed that the clouds had a maximum transmission coefficient of nearly 4500 A. The wave length with which the maximum transmission occurred did not seem to depend on the density of the cloud.

AERODYNAMICS

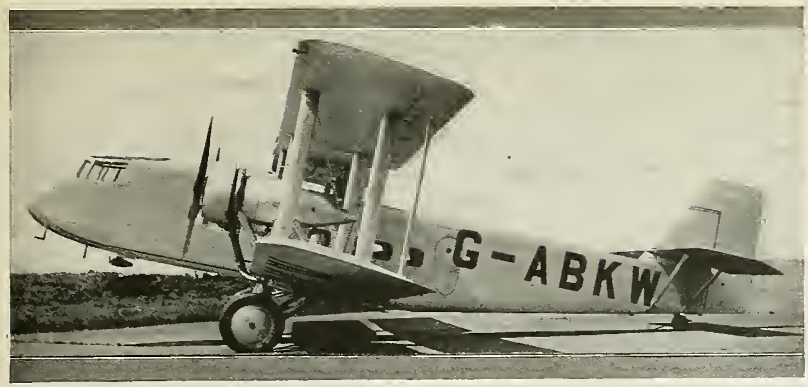
Cavitations of Permanent Form (Sur les cavitations de forme permanente), H. Ponclu and H. Villat. Publications Scientifiques et Techniques du Ministère de L'Air, No. 18, 1932, 114 pp., 13 figs.

EQUATIONS are given for all the motions satisfying conditions that a dead-water region of an elliptical form can exist in a perfect fluid in irrotational motion without change of form during the motion. If the motion is non-cyclic, it is necessary that the eccentricity of the ellipse be below a certain limit. A region is constructed where the centers of rotation of the entire motion are found and formulas developed for determining the elements of the motion numerically. From the calculation of the velocity field, the pressure distribution over the fluid can be determined and also the consequences of the presence of the elliptical dead-water region in irrotational flow.

PROPELLERS

Study of the Deformation of Propellers (Etude de la déformation des hèlices), C. Ledoux and A. Alayrac. Publications Scientifique et Techniques du Ministère de L'Air, No. 15, 1932, 108 pp., 54 figs.

THE THEORETICAL PART of the report established a certain number of geometric relations between the intrinsic elements of the surface of the propeller. The infinitesimal deformation which results from the construction of the propeller, whether or not the blade is deformed, is studied with curves which are useful for considering the resistance of the materials. Finite deformations are also taken up with the object of constructing the plane of the deformed propeller where the r.p.m. has been determined in normal flight. The experimental section of the report is devoted to descriptions of the equipment used to measure exactly the shape of the surface of the propeller either when it is in motion or at rest.



BLACKBURN 10-PASSENGER GENERAL PURPOSE BIPLANE

THE Blackburn 10-passenger biplane is one of two experimental aircraft built to the order of the British Air Ministry, one a biplane and the other a monoplane. These two machines have been built to the same specifications and except for the wing and engine arrangement are identical; the same fuselage design is used for both, the same undercarriage structure, the same engines—two 400-h.p. Armstrong Siddeley "Jaguar IVC"—and they both carry the same load. Both are constructed of metal except for fabric covering of the wings and tail unit.

The biplane is of normal two-bay design. Frise type ailerons are fitted to the wings, which are non-folding. The tail unit is of normal monoplane type. The undercarriage is of the divided type, consisting of two bent axles hinged from the fuselage with radius rods hinged at the rear spars and sprung by pneumatic oleo struts. Dunlop wheels with Bendix brakes are fitted. The fuselage is a semi-monocoque structure built of metal, the skin being corrugated. The control cockpit, situated in the nose, is fitted with two side-by-side seats with dual controls. Between the cockpit and passenger cabin is the forward luggage compartment, which has a capacity of 125 cubic feet. This compartment has a door on the starboard side, through which it is loaded, and doors into the pilot's cockpit and passengers' cabin.

The passenger cabin has a capacity of 540 cubic feet and is equipped with comfortable seating accommodation for 10 passengers. The interior is upholstered in leather and cloth. The side windows are particularly large to ensure adequate interior lighting and to act as emergency exits additional to the roof ventilator and emergency exit at the aft end of the cabin. Adjustable heater vents are provided near the floor, admitting hot air from heater muffs on the engine exhaust pipes. Ventilation is provided independently for each passenger by means of universally mounted spherical louvres.

At the rear end of the passenger cabin is a lavatory. The cabin is entered through a door on the port side, which is barred on the inside during flight. Farther aft with a door on the starboard side is the rear luggage compartment, which has a capacity of 93 cubic feet and may be used for passengers' luggage, mail or freight. Through the rear of this compartment access is given to a walkway through the fuselage to the tail, enabling the fuselage rear structure to be inspected from inside and any necessary attention to be given to the tail control mechanism. Stowage is also provided behind the luggage compartment for spares, maintenance equipment and an emergency aerial mast.

The nose of the fuselage is easily removable to give access to the rear of the instrument board and the rudder controls. The instrument board is indirectly lighted by a duplicated system of small lamps. All normal instruments are fitted, including electrical revolution indicators, fuel capacity gauges and a turn-and-bank indicator. Both rudder bars embody parallel motion pedals and are adjustable; both pilots' seats are also quickly adjustable for height by means of ratchet-type hand levers. Operation of the wheel brakes is effected by a hydraulic system which has a main ratchet lever between the seats for adjusting pressure and, when pulled back, for locking the wheels when the aircraft is at rest. Combined with this control is a differential coupling to the rudder bar which brings the brakes into operation only at extreme movements of the rudder bar and simultaneously increases the braking action on one wheel while releasing the action on the other.

Engine starting is effected by the Ki-gas pressure system. Hand-operated priming pumps are fitted in the leading edge of the lower wing below each engine, and the engine having been primed, compressed air from two air bottles fitted in front of the rudder bars is introduced in turn to an atomizer on each engine. From the atomizer compressed gas is introduced to each cylinder in firing order and the engine turned. Simultaneously the pilot turns a hand-starting magneto. The pressure in the air bottles, sufficient to start the engines several times, is supplied from the normal type of gas starter usually forming part of the equipment of every airport, but alternatively a foot pump fitted to the aircraft is available in emergency. Pressure from the air bottles is also used, after passing through a reduction valve, to operate the fuel capacity gauges.

The electrical services are supplied with current by a wind-driven generator fitted below the cockpit with storage batteries on the floor between the two seats. The wireless apparatus is carried on a panel behind the starboard seat and is operated in conjunction with a trailing aerial. In emergency, wireless communication can still be maintained on the ground by means of a telescopic aerial mast, current being supplied by a hand-operated generator.

An electric fan, mounted in the frame between the forward luggage compartment and passenger cabin, is used to ventilate the cabin when the aircraft is at rest. When not in use, a sliding hatch covers this aperture. Luggage racks for light articles are fitted, one above each line of seats, and at every passenger's side is a pocket in the upholstery for small personal belongings.

The fuselage, which is covered with corrugated Alclad sheet, can be inspected when it is found necessary to renew the cabin furnishings. The engine units, which consist of streamline nacelles mounted between the planes and include the electrical revolution indicator generators and oil tanks, are easily accessible for adjustment or repair, and any part of the superstructure can be reached by means of a special three-sectional ladder which is included in the equipment.

Specifications

	Biplane	*Monoplane*
Wing span	64 ft.	86 ft.
Height	15 ft. 7 in.	14 ft.
Length	54 ft. 8 in.	54 ft. 8 in.
Gross weight	12,145 lbs.	12,580 lbs.
Disposable load	4,405 lbs.	4,380 lbs.
Pay load	2,000 lbs.	2,000 lbs.
Maximum speed	123 m.p.h.	124 m.p.h.
Cruising speed	110 m.p.h.	110 m.p.h.
Landing speed	60 m.p.h.	57 m.p.h.
Normal range	352 miles	356 miles

. AERONAUTICAL INDUSTRY .

Los Angeles to Have 1933 Air Races

THE NATIONAL AIR RACES for 1933 will be held July 1-4 at Los Angeles, Calif., according to an official announcement last month. Cleveland National Air Races, Inc., which contracted two years ago to operate the races in Cleveland for five consecutive years with an option for the following five years, has stated that it does not intend permanently to forego the annual event, but that it believes the sub-letting of the races every two or three years to important cities in other sections will help to guarantee variety and success.

This year's races will be conducted at the Los Angeles Municipal Airport, formerly Mines Field, site of the 1928 National Air Races. A minimum of $40,000 in cash, in addition to many trophies, will be awarded to contestants.

The Vincent Bendix Trophy Race, a speed dash from New York to Los Angeles and the only derby in connection with the races, is planned as a feature for the opening day and will end at the Los Angeles airport as the races begin. The Charles E. Thompson Trophy Race for landplanes over a closed course will be flown July 4 in an attempt to break the world's landplane speed record, which was established in the same race last year. The Aerol Trophy Race for women fliers in landplanes over a closed course is scheduled for July 2.

Only four or five airplane prize groupings will be established this year. All competitions will be free-for-all races for specially built racing craft. Cruises to the races by commercial and sport type planes will be encouraged, but no cash awards will be offered.

Fliers from foreign countries are expected to participate in various events, and it is hoped that Army and Navy pilots will demonstrate exhibition flying, as in former National Air Races.

Clifford W. Henderson, who has been managing director of the National Air Races since 1928, will direct the events again this year. Col. William P. MacCracken, Jr., heads the N. A. A. Contest Committee cooperating with the air race sponsors.

New Chicago Races Announced

A SECOND international air meet, including the Gordon Bennett International Balloon Race, will be held this summer in Chicago from September 1 to September 4, inclusive. As announced in the March AERO DIGEST, a four-day charity air meet also will be held in Chicago July 1-4, free admission to which will be given to the bearer of a pilot's or mechanic's license.

Planned as part of A Century of Progress Exposition, the September races will be flown at the Curtiss-Reynolds Airport and will consist of free-for-all competitions for specially built racing planes. Cash prizes totaling $35,000 have been announced for the events. Army, Navy and Marine fliers will be invited to participate in the meet.

North American—General Merger

DIRECTORS of North American Aviation, Inc., and General Aviation Corp. last month approved a plan whereby the two companies will be united. Certain assets of North American Aviation, Inc., will be segregated into a new company, and the assets of General Aviation Corp., with certain exceptions, will be acquired in exchange for stock of North American Aviation, Inc., after such reorganization.

Assets of North American which will be segregated into the new company consist of all stock of the Sperry Gyroscope Co., Inc.; all stock of the Ford Instrument Co., Inc.; 4.2 per cent of the stock of Intercontinent Aviation, Inc., and the stock of Curtiss-Wright Corp. that is held by North American Aviation, Inc.

Shares of the new company will be issued by North American and distributed to its present stockholders. Upon segregation of these assets, additional shares of North American will be issued to General in exchange for substantially all its assets. After consummation of this plan, General Aviation Corp. will hold approximately 43 per cent of the outstanding stock of North American Aviation.

After final consummation of the plan, wholly owned operating subsidiaries of North American Aviation, Inc., will consist of Eastern Air Transport, Inc.; General Aviation Manufacturing Corp. and the B/J Aircraft Corp. In addition to miscellaneous investments, including a substantial interest in Douglas Aircraft Co., Inc., North American will have the largest single interest in Western Air Express Corp. and Transcontinental Air Transport, Inc., which two companies each own 47½ per cent of Transcontinental & Western Air, Inc. This brings about a unification of the various large interests represented in the mid-transcontinental route.

COMING AERONAUTICAL EVENTS

April 9. Roosevelt Aviation School air meet at Roosevelt Field, L. I., N. Y.

May 7. Air meet at College Park, Md., under the auspices of the Washington Air Derby Association, Inc.

May 7. Air meet at Bakersfield, Calif.

May 15-27. Army Air Corps field trials at Camp Knox, Ky.

May 16-22. International aeronautic rally at Vienna, Austria.

May 25. Aeronautical tourist meet at Wiesbaden, Germany.

May 28. First annual race for the Deutsche de la Meurthe Cup, in France, under Aero Club of France auspices.

May 30. Air races at the Parker D. Cramer Airport, Clarion, Pa.

May 30. Ninety-Nines invitation all-women's race from Floyd Bennett Field, Brooklyn, N. Y., to Valley Stream, L. I., N. Y., and return.

May and June. German Air Sport Exhibition at Stuttgart, Germany.

June 1-November 1. Aeronautical Exhibit at A Century of Progress Exposition, Chicago, Ill.

June 10 (tentative). The 1933 Montreal (Quebec) Air Races.

June 11. International aeronautic meet at Brussels, Belgium.

June 11. International airplane contest at Angers, France.

June 12-July 10. Soaring camp at Elmira, N. Y., under the auspices of The Soaring Society of America, Inc.

June 26-30. Annual meeting of the American Society for Testing Materials at The Stevens, Chicago, Ill.

July. German Air Sport Exhibition at Munich, Germany.

July 1-4. National Air Races of 1933 at Los Angeles, Calif.

July 1-4. International air meet at Chicago, Ill., under the auspices of American Air Race Association.

July 3 (tentative). National meeting of the Ninety-Nines at Los Angeles, Calif.

July 4. Dedication of American Legion Dale Jackson Airport, Faribault, Minn.

July 4. Dedication of the Norfolk-Tidewater Airport at Norfolk, Va.

July 10-23. Fourth Annual National Soaring Contest at Elmira, N. Y.

July 15. International aeronautic rally at Dieppe, France.

August. German Air Sport Exhibition at Hamburg, Germany.

August 30-October 3. Gliding competition at Banne d'Ordanche, France.

September 1-4. International air meet and Gordon Bennett Balloon Race at Chicago, Ill., in connection with A Century of Progress Exposition.

September 9-10. Dedication anniversary program, including air races and aerial demonstrations, at Indianapolis (Ind.) Municipal Airport.

September 30-Oct. 8 (tentative). American Legion air meet at Chicago, Ill.

Cord Takes Control of Aviation Corp.

AS THE RESULT of additional purchases of the company's stock, and accompanied by the resignation of eight of seventeen directors of the firm, E. L. Cord gained control of the Aviation Corp. last month. Offices of the Aviation Corp. will be moved to Chicago, Ill., the headquarters of the Cord Corp., to which executive offices of American Airways, an Aviation Corp. subsidiary, already have been transferred. Cord interests are reported to hold about 1,100,000 of 2,800,000 shares of stock of the Aviation Corp.

Mr. Cord was chosen as chairman of the Aviation Corp. board of directors in the reorganization of the company. L. B. Manning, vice president of the Cord Corp., was elected president of Aviation Corp., with Lyndol L. Young, vice president; R. S. Pruitt, secretary and general counsel, and T. J. Dunnion, treasurer. Besides Messrs. Cord, Manning, Young and Pruitt, the board of directors includes Amon G. Carter, publisher; Frank A. Vanderlip, banker; C. C. Conway, chairman of the board of the Continental Can Co.; C. Coburn Darling and Lester D. Seymour, who continues as president of American Airways.

Directors who resigned just prior to reorganization of the company were President Richard F. Hoyt, Lindley C. Morton, Charles L. Lawrance, Matthew S. Sloan, Lamotte T. Cohu, Robert Lehman, W. A. Harriman and George R. Hann.

Mr. Manning heads the new board of directors of American Airways, of which Messrs. Cord, Pruitt, Seymour and Young also are members. Mr. Young is vice president of the airline; Mr. Pruitt, secretary and general counsel, and Mr. Dunnion, treasurer.

Bureau of Standards Head Chosen

PRESIDENT ROOSEVELT last month nominated Lyman J. Briggs of Michigan as director of the Bureau of Standards. Mr. Briggs has been acting director of the Bureau.

American Airplane Production in 1932

OFFICIAL FIGURES of the Aeronautics Branch, Department of Commerce, showed that 1,396 airplanes were manufactured in the United States in 1932. A total of 667 airplanes were produced for domestic civil use by 270 companies or individuals. Of these, six companies manufactured approximately forty per cent of the total aircraft destined for domestic and commercial use.

Erickson Operates Used Plane Business

AERO BROKERAGE SERVICE CO. of Inglewood, Calif., has dissolved partnership and is being operated solely by E. L. Erickson, the originator of the company.

MacDonald Joins Granville

WALTER A. MACDONALD has announced his resignation from the Bellanca Aircraft Corp. and his appointment to the sales executive staff of Granville Aircraft Corp. Mr. MacDonald was formerly sales manager for Bellanca and regional distributor in charge of the Bellanca offices in New York. Mr. MacDonald now will devote his entire efforts to the sales of Granville aircraft. This places him once more in immediate association with William B. Hurlburt, vice president of the Granville organization, Mr. MacDonald having been long connected with Mr. Hurlburt in both the automobile and aeronautical industries.

Granville Aircraft Corp. has gone into production with its new Granville Eightster, an eight-place high-speed transport.

The Granville C-8 represents an adaptation to the cabin transport of several features and characteristics developed by Zantford D. Granville in his design and construction of the world's fastest landplane, known as the Gee-Bee R-1. An outstanding feature of the racing plane was the fuselage of unusually large diameter, somewhat greater than the diameter of the radial engine. While this produced a plane of unusual appearance, it was proved to be efficient from the standpoint of speed, the R-1 model attaining a top rate of 309 m.p.h. and establishing the new world's landplane speed record of 296 m.p.h. Adapted to the new transport type, this feature enables the designer to produce a transport with a cruising speed of approximately 200 m.p.h. and a high speed of approximately 225 m.p.h. It further enables him to build in his fuselage an extraordinarily large cabin.

The C-8 is designed for service on either wheel gear or floats, and fittings are provided for quick and easy change from one to the other.

The power plant of the C-8 is the Wright Cyclone R-1820-F, developing 700 h.p. at sea level. It is equipped with electric starter and generator. Standard equipment includes a storage battery for starting and for the radio.

DIGEST OF RECENT EVENTS

Air Show Held at Tucson

ABOUT twenty commercial planes and a group of military planes from March Field participated in the annual air show at Tucson, Ariz. (Feb. 26.)

Roosevelt Reviews Air Force

AIRCRAFT of the eastern air defense force passed in review above President Roosevelt as part of the Inauguration Day ceremonies. (Mar. 4.)

Balloon Reaches High Altitude

THE POLISH MILITARY BALLOON, *Polonia*, a participant in the 1932 Gordon Bennett Balloon Race, was reported to have attained a height of 32,808 feet. (Mar. 6.)

French Plane Makes Speed Records

AVERAGE SPEEDS of 281¼ kilometers per hour were attained in two flights of a Potez 50, with pay loads of 500 and 1,000 kilograms, respectively. These flights, in which the plane was piloted by M. Lemoine, were made over a 1,000-kilometer course from Paris to Angers, France, and return, and established two new world's speed records. (Mar. 8.)

Christening of the "Macon"

THE NAVAL AIRSHIP *Macon* was christened by Mrs. William A. Moffett, wife of the chief of the Naval Bureau of Aeronautics, at Akron, Ohio. The *Macon* was air borne within the Goodyear-Zeppelin hangar for the first time shortly after the ceremony. Comdr. A. H. Dresel was presented with a silver service for the airship. (Mar. 11.)

Smith Almost Reaches Goal

IN HIS THIRD attempt to break the England-to-Cape Town speed record, Victor Smith, 19-year-old South African flier, was forced to land by failure of his fuel supply when only about 200 miles north of his goal. He landed in Cape Province after flying from England in ten hours less time than was consumed by Mrs. Amy Johnson Mollison in her record flight over the route several months earlier. (Mar. 13.)

Boeing Field Has Air Show

ABOUT 6,000 people attended the first spring air show at Boeing Field, Seattle, Wash., in which flying by County Commissioner John C. Stevenson was featured. (Mar. 19.)

Blind Flight Ends in Blind Landing

JAMES L. KINNEY, Department of Commerce pilot, flew blind the entire distance from College Park, Md., to Newark, N. J., and landed safely with the aid of the new Department of Commerce radio installation for blind landings at Newark Airport. (Mar. 20.)

"Akron" Returns from Panama

THE NAVAL AIRSHIP *Akron* returned to Lakehurst, N. J., after an absence of several days during which she made a cruise to the Panama Canal Zone, stopping at Miami, Fla., en route. (Mar. 23.)

New Jersey Annual Aviation Report

THE STATE of New Jersey remains the busiest airway in the world, according to the 1932 annual report of the New Jersey State Department of Aviation, submitted by Director Gill Robb Wilson to Governor A. Harry Moore. Approximately thirty of every 100 passengers embarking in or debarking from scheduled aircraft in the United States are doing so at New Jersey airports, the report states. The same relation applies to loading and unloading of air mail.

No passengers on commercial flights were killed or injured in the state, and aircraft accidents decreased over fifty per cent as compared with the record in 1931. No death or injury occurred in any race, acrobatic demonstration or air meet in New Jersey during 1932.

Eight new community fields were developed, and aerial markings covering 500 miles of state highway were placed. Federal ratings were given to twenty-eight landing areas. New pilots were divided into the following classifications: Student, 230; private, ninety-two; limited commercial, eighteen, and transport, fifteen.

Ohio Aeronautical Firms Founded

INCORPORATION papers have been issued to Flying Services, Inc., Willoughby, Ohio. The company has an authorized capital of $25,000. Incorporators are David C. Haynes, Mary L. Elder and Ruth A. Smedley.

Incorporation papers have been granted to Aviation Schedule Corp. of Toledo. Incorporators are James D. Ruhl, Sidney Tuschman and Robert H. Randall.

Another Ohio aeronautical firm to be organized is the Aero-Ways Co., Inc., of Cleveland. Incorporators are T. E. Byron, B. G. Field and A. Alan Meltzer.

Fairchild Develops Mapping Camera

A MAPPING CAMERA with four lenses, eight filters and equipped with an electrically operated ground-speed indicator, automatically taking pictures at proper intervals, has been developed by Fairchild Aerial Surveys of New York City. Contour lines one foot apart may be plotted with accuracy on the finished photographs.

Appraising Land by Airplane

PHOTOGRAPHING FARMS for mortgage bankers is being built into a profitable business by Harry Wimer and Gerald McMillen, both of Council Bluffs, Iowa. They do work in five surrounding states for the mortgage brokers concentrated in Council Bluffs, Omaha, Neb.; Sioux Falls, S. D., and Sioux City, Iowa.

By means of the photographs, company officials say, a preliminary field trip by two field men is saved on each application. A tentative decision on a loan can be made from the office by means of the photographs. From pictures, company geologists can appraise the type and value of the land. Agronomists in their employ can evaluate farm equipment and can even estimate closely yield and value of standing crops.

McMillen, who formerly was with the 9th Photo Section and 16th Observation Squadron, uses a camera he designed and built especially for the work. Wimer, a transport pilot, flies the J-6 Robin used in the flights.

Chicago Tool Warehouse Opened

IN ORDER more effectively to care for the requirements of the users of Morse tools, the Morse Twist Drill & Machine Co. of New Bedford, Mass., is now carrying a complete stock of high-speed and carbon drills, reamers, taps, dies and milling cutters at 570 West Randolph Street, Chicago, Ill. This stock will supplement distributors' stocks in Chicago and the Middle West.

Waco Adds to Staff

PAUL SNICK, formerly of Fleet Aircraft, Inc., of Buffalo, is now connected with The Waco Aircraft Co. at Troy, Ohio, replacing Howard Ailor as special representative.

Mr. Ailor, who is president of Waco Sales of New York, Inc., at Roosevelt Field, L. I., N. Y., is eastern distributor for Waco airplanes. He has announced that the first preview of the new line of 1933 Wacos will be held at his hangar at the field from April 22 to April 30, inclusive.

Westinghouse Merges Activities

CONSOLIDATION of its aviation activities under one head was announced last month by the Westinghouse Electric and Manufacturing Co. The various sales and engineering departments involved in aviation activity have been coordinated in the transportation sales department under the direction of M. B. Lambert, sales manager. A. P. Schrader will directly supervise the headquarters organization.

Airlanes, Inc., Is Organized

A CHARTER and air travel ticket service to be known as Airlines, Inc., had been formed, with headquarters at 200 Madison Avenue, New York. Capt. J. Erroll Boyd is president of the organization, with Clyde E. Pangborn and Frank Furedy as vice presidents and Robert G. Lyon as secretary and treasurer. These officers and Capt. Horace B. Wild are directors of the company, with which Jack O'Meara also is associated.

The company has obtained exclusive rights for the use of the Kellett type of letters for aerial advertising, towed by an autogiro. Equipment of the firm also includes several airplanes, among which is the Bellanca *Columbia,* flown non-stop in 1927 from Roosevelt Field, New York, to Eisleben, Germany, by Chamberlin. Captain Boyd is planning an attempt to break the world's solo endurance record in the ship, in which he and Lieut. Harry P. Connor flew from Toronto, Ontario, to London, England.

The "Beaux Arts" flying club, operating on Sundays at Flushing, L. I., airport, has been organized by the company. A seven-place Travel Air will be used.

Fairchild Appoints Pennsylvania Agent

OLLIE DAVIS of Camden, N. J., has become associated with Fairchild Airplane Sales Corp. as factory representative. Mr. Davis, who was formerly connected with Jacobs Aircraft Engine and Ludington Flying Service, in his association with Fairchild will handle sales in Pennsylvania and the Midwest territory.

Firm Opens Used Plane Business

G. MOLLER and Foster Walton have resigned from Northeastern Air Service at Bridgeport, Conn., to form a new company, Moller-Walton, at New Canaan, Conn. The new organization is distributor for a new dropforged steel replacement cylinder for Szekely Motors. It plans to carry on an extensive used airplane business.

L. N. Brutus, vice president and treasurer, and Clayton J. Brukner, president and general manager, of The Waco Aircraft Co. with the new Model C four-place cabin Waco they have been testing

Parts-Selling Firm Opens Business

AIR-PARTS has been organized by Lieut. W. B. Hawkins, with offices and salesrooms at Glendale, Calif., near Grand Central Air Terminal. The company is selling a line of serviceable used airplane and engine parts, aircraft engines, propellers, parachutes and instruments. The location is shared with Pacific Airplane Engine Co., which is owned by W. E. Hagelin, former chief engine inspector for the Kinner Airplane & Motor Corp.

Lieutenant Hawkins was a co-partner of the Aero Brokerage Service Co. for the past three years but recently dissolved the partnership and sold his interest to start his own business. He has been active in aviation since 1917, and his experience includes operation of an airport and engaging in various flying occupations, such as student training, picture flying, Mexican airline flying, forest patrol and airplane sales and demonstration, until entering the used airplane business in 1930.

Aerial Photography Company Organized

THE AERO-GRAPHIC CORP., in opening its office at Bowman Field, Louisville, Ky., last month, announced a program of aerial photography, surveying, advertising and chartered plane service extending throughout Kentucky. W. A. Shrader, general manager, a former aerial photographer for Curtiss-Wright, said that immediate plans call for the assembling of a file of 500 black pictures of the entire state and the establishment, within ninety days, of branch offices in Nashville, Tenn.; Cincinnati, Ohio, and Indianapolis and Evansville, Ind. In the fall an office will be opened in Jacksonville, Fla. Eighteen experienced pilots and aerial photographers will comprise the personnel, while the equipment includes the latest-type cameras and a Curtiss Thrush six-passenger cabin plane. J. A. Shrader is president.

Doolittle Heads New Shell Department

MAJ. JAMES H. DOOLITTLE, holder of the world's landplane and American seaplane speed records, and manager of the aviation department of the Shell Petroleum Corp., has been appointed to serve in a similar capacity with the Shell Eastern Petroleum Products, Inc., of New York. Maj. R. G. Ervin, who has been connected with Shell Eastern's aviation department for several years, will be in charge of the department in New York City, under Major Doolittle, whose headquarters will remain in St. Louis, Mo.

Westinghouse Elects Two Officers

PRESIDENT F. A. MERRICK of Westinghouse Electric and Manufacturing Co. has announced the election of two new officials. They are C. E. Stephens, formerly commercial vice president, with headquarters in New York, who was elected vice president, and N. G. Symonds, formerly commercial vice president at Chicago. The latter was elected vice president in charge of sales, and his headquarters will be at the general offices of the company in East Pittsburgh, Pennsylvania.

Towing Signs for Planes

A COMPLETE LINE of towing signs capable of being towed by an average plane is being put on the market by Air Transport Equipment, Inc., of Roosevelt Field, Long Island, N. Y. These signs are of a new type, permitting the quick change of any letters.

The company also has announced that it keeps in stock magnesium sheets in all gauges. This alloy weighs one-third less than aluminum and has a tensile strength of 40,000 pounds per square inch.

Cabin Autogiro Dealer Chosen

GIRO SALES & SERVICE, INC., of Roosevelt Field, Long Island, N. Y., has been appointed as dealer for the four-passenger Pitcairn cabin autogiro. The ship has been added to the Giro Sales & Service company's line of Kellett autogiros.

Aeronautical Service Station Opened

THE AVIATION ENGINEERING CO. has leased three floors at 2437 South Michigan Avenue, Chicago, Ill. The firm will engage in sales, supply of engine parts, airplane designing, experimenting, manufacturing and repairing.

The new company consists of Scotty Clyde, general manager, and Bill Edwards, sales manager. Scotty Clyde has been affiliated with aviation for a number of years. In 1917 he was foreman for the Wright company, making Wright engines, and has been associated with well known aircraft builders. Bill Edwards was an officer in the United States Army Air Corps and later participated in Army aircraft production. For the past four years he has been with the Curtiss-Wright organization.

Aid to Pratt & Whitney President

THE APPOINTMENT of T. E. Tillinghast to the position of assistant to the president of the Pratt & Whitney Aircraft Co. was announced recently by Donald L. Brown, president of the firm. Mr. Tillinghast is to have direct supervision of the service, installation and engineering contact divisions of the company and will coordinate company activities connected with its contacts with the operating and engineering personnel of the aircraft industry and air services. Formerly executive engineer of the firm, Mr. Tillinghast was chosen as a director two years ago.

Philadelphia Group for Air Defense

THE AIR DEFENSE LEAGUE, a chartered organization to seek Congressional ratification of an adequate national air defense, has been established in Philadelphia, Pa. The organization has two objectives, to keep the public acquainted with the true state of American air forces as contrasted to those of other first-class powers and to provide Congress with reliable data on this subject, free of all propaganda. Officers of the group include Jay Cooke, 2nd; H. Harrison Smith, Col. William Innes Forbes, Dr. Josiah H. Penniman, John B. Stetson, Jr., and V. H. Frazier.

Hi-Duty Tube Coupling Patented

THE IMPERIAL BRASS Manufacturing Company of Chicago, Ill., has announced the issuing of a patent on its Hi-Duty tube coupling. These tube couplings are for use on copper, Shelby, aluminum, Bundyweld, Everdur, Monel and steel tubing.

Company Prepares for Greater Activity

NORMA-HOFFMAN BEARINGS Corporation of Stamford, Conn., has been making extensive additions to its line of "Precision" ball, roller and thrust bearings. As a step in preparation for larger production, John W. MacMorris has been engaged as factory manager. For nine years he was factory manager for S K F Industries at their Hartford plant.

Ex-Cell-O Announces Personnel Changes

EARL L. RAMSEY, who has been in the general sales office of Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., is now production engineer working with the sales representatives in the different territories covering all products of Ex-Cell-O.

E. D. Wolf, formerly general sales manager of Whitman & Barnes, Inc., has joined the Ex-Cell-O organization and will be in charge of the general sales office.

Plane Exhibit at Chicago Exposition

ONE of the newest transport planes on United Air Lines will form part of United Air Lines' exhibit at A Century of Progress, Chicago, Ill., next summer. The plane, a Boeing, capable of carrying ten passengers, 400 pounds of cargo and two pilots at a cruising speed of 155 miles per hour, will be placed beside a plane produced over twenty-five years ago.

Oklahoma Aviation Firm Formed

THE SOUTHWEST Aviation and Service Corp. has been granted a charter at Oklahoma City. Capital stock is $5,000. Incorporators are C. R. Nuckells, W. F. Eddy and D. O. Johnson, all of Oklahoma City.

RYAN
LEADS
again
WITH 3 NEW
TRAINING FEATURES

1 WEEMS SYSTEM OF NAVIGATION

The Ryan School of Aeronautics announces the establishment of an advanced course in NAVIGATION, personally given by Lt. Comm. P. V. H. Weems, U.S.N. This is the greatest opportunity for pilots to train under the personal direction of this internationally renowned navigation authority.

2 AMPHIBIAN TRAINING

The Ryan School of Aeronautics is probably the only approved school in the United States where students receive amphibian flight training as a part of their regular instruction. A modern flying boat type of amphibian, with retractable landing gear, is now a part of the equipment used by Ryan Transport, Limited Commercial and Private students without extra charge. No other place is as ideal as San Diego for land and water flying. Now you can enjoy the thrill and added commercial advantages of a SEAPLANE RATING along with your regular license!

3 REDUCED RATES

Ryan students profit by the new Department of Commerce regulations which went into effect March 1st. In recognition of the superior training given in the Government Approved courses at the Ryan School of Aeronautics fewer hours are now required to qualify for Limited Commercial and Transport Licenses. Ryan passes this saving on with an immediate reduction in tuition rates.

CHECK HERE FOR FURTHER INFORMATION ABOUT—

WEEMS CELESTIAL & DEAD RECKONING NAVIGATION COURSES

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☐ Home Study Course 100
☐ Instruments and Text Books only.

RYAN FLYING & MECHANICS COURSES

☐ Transport ☐ Limited Commercial
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☐ DeLuxe Transport Course—plus New Great Lakes Plane

RYAN
SCHOOL OF AERONAUTICS
Gov't. Approved
On Lindbergh Field
SAN DIEGO CALIFORNIA

TRADE LITERATURE

Protectoseal Products

THE SIXTY-PAGE BOOKLET illustrating safety devices manufactured by Protectoseal Co., Chicago, Ill., for flammable and explosive liquids is of especial interest to the aeronautical industry. Among the devices described are: Tank vents and fillers; hand transfer pumps for drums; non-explosive cans for gasoline in sizes from one quart to 10 gallons; supply and service cans; laboratory cans; heavy-duty cans for field service; bench cans for washing small parts, moistening swabs and sponges; wash cans for tools, bearings, machined parts, small assemblies, etc.; dip tanks for bulk washing with flammables; touch-up cans for cleaning delicate parts with brush; varnish and paint cans for small operations; oily waste cans and a great number of special products devised to eliminate the fire hazard for operations requiring the handling of gasoline or similar liquids.

Products shown in the catalog represent years of study and experimentation under actual operating conditions. Their use will increase safety in plant operation involving flammable liquids. Certain operations do not permit of safety in its absolute sense, but the hazards can be materially reduced. The fittings do not interfere with efficiency.

The catalog is replete with halftone illustrations, some of which are in two colors; line drawings and installation diagrams. Comprehensive information on weights, etc., also is given.

Folder on Stainless Steel Tubing

A BULLETIN on welded stainless steel tubing has been published by The Carpenter Steel Co. of Reading, Pa. In addition to general information regarding the tubing, the pamphlet describes its physical properties and gives detailed working instructions for various operations. Illustrations portray the tubing in special shapes and finishes and show the results of tests.

NEW AERONAUTICAL BOOKS

FLYING

By MAJ. GEN. JAMES E. FECHET,

PROGRESS of aeronautics is depicted in an interesting and informative manner in "Flying," which is Maj. Gen. James E. Fechet's contribution to the Century of Progress Series of books. Covering important developments in various fields, the series has been produced by an advisory committee in connection with spreading the message of A Century of Progress International Exposition this year at Chicago.

Preceded by a foreword by the leading American war ace, Capt. Edward V. Rickenbacker, an introductory chapter traces the history of aviation from the days of mythology to the first motor-driven flight by the Wright brothers. The remainder of the book is concerned with subsequent aeronautical developments, in which the influence of the World War and of spectacular flights are emphasized.

Most of the book has to do with modern flying equipment, personnel and methods. Written in a simple, clear manner, various chapters cover the topics of physical and mental requirements of a successful pilot, methods of flying instruction, aircraft and construction procedure, engines and propellers and uses for aircraft.

In the final chapter the author speculates upon the future of aviation. He points out paths to improvement in the field of aeronautics and calls attention to problems that have already begun to exist. The future of aviation lies, General Fechet predicts, in three spheres—as a protective weapon, a private vehicle and a public carrier.

HIGH SPEED DIESEL ENGINES

By ARTHUR W. JUDGE

WRITTEN as an elementary textbook primarily for engineers, students and operators, "High Speed Diesel Engines" covers practical and theoretical aspects of the high-speed compression-ignition engine. This book, which is illustrated with photographs and drawings of engines and their parts, as well as charts and diagrams, outlines much of contemporary knowledge of the theory of the engines' operation. Descriptive and practical information regarding the design and operation of engines also is included. Two chapters contain material on care and maintenance of the engines and the use of fuels and fuel filters.

In addition to data on high-speed compression-ignition engines in general and chapters on automobile, stationary and railway types, the book includes a section devoted to aircraft engines. Performances and characteristics of the Diesel, or compression-ignition, engines are compared with those of the gasoline engines. Special attention is paid to details of the British Beardmore and Rolls Royce Condor engines; the French Clerget; the German Junkers, Maybach and M. A. N.; the Italian Fiat, and the American Packard.

• FOREIGN NEWS IN BRIEF •

THE DEUTSCHE DE LA MEURTHE RACE

THIRTEEN PLANES have been entered in the first race for the Deutsche de la Meurthe Cup, to be held May 28, according to a recent announcement of the Aero Club of France. Although England, Italy and the United States have been invited to race for the trophy, only French planes had been entered at the time of the announcement.

The Deutsche de la Meurthe Cup has been established as a trophy for international competition of landplanes. The race will consist of two flights over a closed circuit of about 600 miles each. A minimum speed of about 120 m.p.h. and a maximum cylinder capacity of eight liters are required of planes to be entered.

AUSTRALASIA

THE CIVIL AVIATION DEPARTMENT has sanctioned twenty-five new airdromes in different parts of the Commonwealth. There are now 106 licensed airdromes in Australia and 185 landing grounds.

AN AERIAL SURVEY of the country from the Livesy range to the Rawlinson range, and Lake Christopher, has been carried out by the West Centralian expeditions plane.

THE IMPORTANT PART which aerial photography is already playing in geological research and the search for oil in Australia is emphasized in a report to the Federal Government by Commonwealth Geological Adviser Woolnough. Since completing an experimental aerial survey flight around Australia, Dr. Woolnough has flown over Tasmania and portions of Victoria and South Australia.

A SMALL HERD of dairy cattle was recently flown by plane from Lae, New Guinea, to Wau, in the interior, without mishap. The cattle were delivered at their destination in forty minutes, as compared with six weeks necessary by train.

CANADA

ACCORDING to a report recently issued by the Civil Aviation Branch of the Canadian Department of National Defence, 412,409 pounds of air mail were carried in 1932. Most mail for the year was carried in December, amounting to nearly 65,000 pounds, a third of which was flown to Charlottetown on Prince Edward Island, from Moncton, New Brunswick. The island province was practically cut off from the rest of Canada by exceptional ice conditions and storms, which made mail delivery by the usual steamer impossible.

GOVERNMENT-SPONSORED flying clubs during last year were twenty-three in number with a membership of 2,703 and sixty-eight aircraft in use. More pupils were under instruction last year than any year except 1929, with 872 in 1932. Out of this number 129 obtained private pilot licenses and twenty-seven commercial licenses. Halifax Aero Club had the most flying hours, with 1,100, and Winnipeg was second, with 1,012 hours. The Halifax club had 110 members last year.

AVERAGE flying time figures for The Saint John (N. B.) Flying Club have considerably increased in the last few months. A ground school, organized by the club with the aid of the Canadian Flying Clubs Association, will begin soon. Members of the club will be privileged to take friends to the meetings. Changes in flying rates have been announced.

AT THE ANNUAL MEETING of the Canadian Flying Clubs' Association held at Toronto, A. H. Keith Russell, past president of the Toronto Flying Club, was elected president of the organization, marking the first time since the association was formed a few years ago that a president of an eastern Canadian club has been chosen for this position. Other officers elected included: H. P. Crabb, Winnipeg, first vice president; Charles Becker, Edmonton, western zone vice president; Lloyd H. Smith, Hamilton, central zone vice president; R. J. R. Nelson, Halifax, maritime zone vice president; M. A. Seymour, St. Catherines, treasurer, and George M. Ross, Ottawa, executive secretary. Of the officers elected seven are former war pilots. The next annual meeting is to be held in Winnipeg.

GERMANY

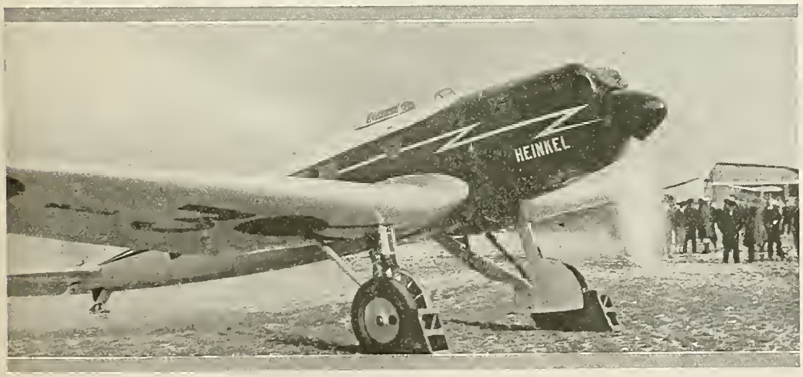
THE SECOND German Air Sport Exhibition will be held this year in various cities. Last month it was scheduled to be given at Essen. Next month and in June the exhibition will be held in Stuttgart, at Munich in July, at Hamburg in August and at Hanover in November.

MAY 6 has been chosen as the date on which the *Graf Zeppelin* will resume her passenger trips between Germany and South America. One round trip a month will be made until September 2, after which sailings will occur every two weeks until October 28. The passenger fare has been lowered twenty per cent.

After completion of airship stations in Brazil and Spain, the South American airship terminal will be at Rio de Janeiro and landings also will be made at Barcelona or Seville, Spain.

TWO SPEED RECORDS were made on a closed-circuit course near Berlin March 17 by the He-70, the new transport plane made by the Ernst Heinkel Aircraft Corp. of Warnemünde. The plane flew a fraction over 216 m.p.h. with and without pay loads of 1100 pounds.

The ship is a single-engine low-wing monoplane with a seating capacity for seven persons. The landing gear, tail skid and radiator are fully retractable, and even the door handles are countersunk. The windows, set flush with the skin of the fuselage, are of non-shatterable curved glass. The plane is powered with a chemically cooled direct-drive B.M.W. VI engine, which develops 630 h.p. at 1600 r.p.m. and permits use of a more efficient propeller.



Heinkel seven-place transport, He-70, used on the Luft Hansa airlines

GREAT BRITAIN

FOUR DAILY AIR SERVICES will be operated between London and Paris by Imperial Airways beginning April 9, according to an announcement by the airline.

WEIGHT OF LETTERS dispatched by air from Great Britain during 1932 exceeded all previous records, amounting to sixty-four tons. This was an increase of twenty per cent over the tonnage for 1931.

A ROLLS-ROYCE AIRCRAFT engine was largely responsible for the recent establishment of a world's speed record for automobiles by Sir Malcolm Campbell. His "Blue Bird" automobile, in which he drove over a measured mile at Daytona Beach, Florida, at an average speed of 272.1 m.p.h., is powered with a 2350-h.p. Rolls-Royce R racing engine. The highest engine speed recorded during the run was 3700 r.p.m., equivalent to 330 m.p.h., but wheel slip caused loss of speed.

The engine is a twelve-cylinder water-cooled unit with a total weight of 1630 pounds. At full throttle it consumes twenty-eight gallons of special fuel. The engine also has to its credit the world's flying speed record of 406.997 m.p.h., established in 1931.

ACCORDING to official estimates last month, the cost of the British Air Force to taxpayers will be £17,426,000 for the next year, an increase of £26,000. In spite of the larger sum needed, according to the Air Minister, the Marquess of Londonderry, economies totaling about £340,000 are included in the estimates. The greatest increase is £360,000, to be devoted to the air force in Iraq.

SIR JOHN SALMOND, whose resignation as military chief of the Royal Air Force, will take effect April 1, will become government director on the board of Imperial Airways. He will succeed Air Vice Marshal Sir Vyell Vyvyan, who will retire from the board after seven years' service.

NOTABLE SUCCESSES in two-way radio communication between an airplane in flight and ground stations were achieved in preliminary tests of the short-wave receiving and transmitting apparatus specially devised for installation in the new four-engine monoplane airliners that are going into service on the British airway between Cairo and Cape Town. From the cabin of the Imperial Airways flying boat *City of Swanage*, a three-engined craft of the Short "Calcutta" class, the wireless engineer established touch with stations as far as 5,000 miles away. Sending from a point several thousand feet above the valley of the White Nile between Juba and Kampala, he maintained two-way communication with the British post office station at Portishead, near Bristol. He also established effective contact with Norddeich, Germany, nearly 5,000 miles distant, and with Coltano, in northern Italy, approximately 4,000 miles away. News messages were received from the wireless station at Miami Beach, U. S. A.

THE FIRST PUPIL to be trained for a pilot's license on the new six-h. p. ultra-light airplane is Mrs. S. Green, a pupil at the London Air Park, Feltham. The new aircraft are the B. A. C. Type VII sailplanes, fitted with Douglas twin-cylinder motorcycle engines of 600-c.c. capacity. These machines are being developed at the London Air Park by National Flying Services, Ltd., in collaboration with C. H. Lowe Wylde, the designer.

OWING to the increase of air mail transport, letters carried by British aircraft having grown in numbers from 200,000 a year eight years ago to more than 6,000,000 a year at the present time, Imperial Airways have now established, at their airway terminus, Victoria Station, London, a special department to deal with inquiries concerning the flying mail and also to distribute information on this subject.

FRESH PROOF was recently afforded of the time-saving of the air-and-ocean freight service which was instituted some time ago by Imperial Airways in conjunction with ocean shipping companies. A consignment of goods was sent by mail plane, airliner and ocean liner over a distance of 12,000 miles from Los Angeles, Calif., to Poona, India. After being flown by air mail from Los Angeles to New York, this parcel was put on board an ocean liner departing for Europe, and on arriving in London was sent to the Croydon airport to catch an airliner bound for India. The package completed its journey in eighteen days, a saving of fifteen days over ordinary methods of travel.

GREECE

AN AIRLINE from Athens to Alexandria, Egypt, will be operated beginning in June, according to plans of the Greek Air Transportation Co. The service will be operated via Heracleion, Crete, and will be the first line to a foreign country maintained by a Greek air transport concern.

INDIA

RESOLUTIONS recommending the establishment of flat rates for mail between the United Kingdom and India and a lowering of postal rates by mail were passed at a recent meeting of Associated Chambers of Commerce in Calcutta. It was also urged that arrangements be made to establish a service from Karachi to Rangoon and that fuller advantages of the Dutch and French air services might be made available to the public. Plans have been practically completed for an air service for parcels and passengers between Bombay, Poona, Surat and Ahmadabad.

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AERO DIGEST, over a period of years, has earned the reputation of usually being first with technical descriptions of the new planes and engines; and of always presenting the most complete and interesting descriptions, photographs and three-view drawings. This information is valuable to engineers, transport and commercial operators, the military services, aircraft, engine and airline executives—in fact, to everyone who must maintain constant contact with aeronautical developments. • • • To those who are not subscribers already we say, buy a copy of any other aviation magazine and compare it with AERO DIGEST. Then you will be convinced that the DIGEST is the magazine you want to read regularly.

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CITY ....
STATE ....
OCCUPATION ....

MEXICO

A 100% RATING for safety and performance last year has been awarded the Mexican Aviation Co. (Pan American Airways subsidiary) by the Ministry of Communications and Public Works. According to the Ministry's figures, the company's planes during 1932 made 1,609 flights, covered 1,274,188 kilometers and transported 10,828 passengers, 36,016 kilograms of mail, 70,440 kilograms of express and 145,524 kilograms of baggage. No accident of any kind occurred on the airline during 1932.

THE TAMUALIPAS state chief of military operations has ordered his troops to lay out a landing field at Villa Juarez, center of the important farming and sugar products region of El Mante, and to repair the civil airport at Ciudad Victoria, the state capital.

MEXICAN AIRPORT MANAGERS must forbid planes to load firearms, war munitions, explosives and narcotics unless the craft operators have permits to transport such articles, and must prohibit passengers other than government agents in charge of such consignments to travel in planes so laden, under orders issued by the Ministry of Communications and Public Works.

EIGHT EXECUTIVES of the Huasteca Petroleum Co. recently inspected the company's interests in all the important cities and towns of central, western and northern Mexico in four days, as compared with the five weeks that would have been required had they used land transportation. The plane used was a Fokker trimotor chartered from the Mexican Aviation Co., Pan American Airways unit. The route covered was approximately 3,500 miles.

GEORGE LAW, American civilian pilot, has applied to the Chihuahua State Government for a concession to operate a thrice-weekly passenger, mail and express service out of Chihuahua City to the mountain region towns of Beseasiachic, Chinipas and Batopilas. A condition of the proposition is that the commonwealth and municipal governments establish and maintain landing fields at the towns. The state authorities are favorably disposed to the application, as these mountain communities lack adequate transportation facilities.

A SEMI-WEEKLY passenger and mail service has been inaugurated between Mexico City and the Pacific Coast port resort of Acapulco by Antonio Sea and Esteban Gonzalez. Stops are made at Iguala, Chilpancingo and Cuautla.

TWO young Mexican women who are the first of their sex to obtain pilots' licenses in their country are Señorita Maria Catalina Encinas, graduate of the School of Civil Aeronautics, Chihuahua City, and Señorita Maria Arcos Cedillo, who received her flying diploma in a San Luis Potosi City aviation school. Señorita Cedillo has the additional distinction of being the first Mexican girl to make a solo flight in Mexico.

AIR CIRCUSES, in which prominent civilian and military aviators perform, are being staged in various cities of Mexico to obtain contributions to the $165,000 fund that the Federal Government is raising to relieve repatriated nationals who are returning from the United States and other countries.

ALBERTO PETRI, capitalist of Monterrey, has been granted a concession to operate on an experimental basis a passenger, mail and express service between Monterrey, Ciudad Victoria and Mexico City, according to the aviation department of the Ministry of Communications and Public Works. Service was to start last month.

MIDDLE EAST

IT IS EXPECTED that the Iraq state airdrome at Baghdad will be opened about April 15. The airport is on Government land, in close proximity to the center of the city. A two-floor building with observation and clock tower at the center has been erected, containing ticket offices for the various companies, customs office, restaurant and buffet, and bedrooms. It is proposed to concentrate the cross-desert motor traffic entering the city there also, for customs purposes. The expenditure on the airport has been about $100,000.

There is a take-off run of over 1,000 yards in any direction on the field and of at least a mile in the direction of the prevailing wind. An earthwork protection has been constructed around the airport for protection against floods.

SWEDEN

AN APPROPRIATION of 637,000 crowns (about $117,200) has been granted for 1932-33 to the only commercial aviation company in Sweden, Aktiebolaget Aerotransport, by the Swedish Government. In the budget proposed for 1933-34, although most Governmental appropriations have been lowered, this sum has been increased to 650,000 crowns for the development of civil aviation.

TWO AIRPORTS are under construction, at Skanes Fagerhult and at Jonkoping. The first airport will be approximately 3,229,200 square feet in area. Building of the airport is expected to consume about three years and to cost 380,000 crowns. This field is at the junction of the Malmo-Gothenburg and Malmo-Stockholm services.

The Jonkoping airport, located on the Malmo-Stockholm route, will offer landing facilities for both landplanes and seaplanes. Its area will be about 3,391,424 square feet, and the cost of construction will be about 1,000,000 crowns, the national government and the city sharing expenses.

How sportsmen pilots use their airplanes . . . .

Aircraft Dealers will find many helpful suggestions in *The Sportsman Pilot*

EVERY issue contains stories about and by sportsmen pilots, telling of the manner in which they use their aircraft in the pursuit of sport. These stories are mighty interesting reading; but more than that, they are smart sales leads for the wide awake dealer who will use them as examples for their prospects. Every prospective plane owner is interested in knowing what the other fellow does with his plane. • • • Nowhere else can the aircraft dealer secure so many helpful suggestions for selling aircraft to private fliers. If you are not acquainted with **The Sportsman Pilot** we shall be glad to send you a sample copy.

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EDITORIALS

(*Continued from page* 20)

Consider travel by air when planning your vacation, whether it is a hundred-mile jaunt or a transcontinental hop, not alone for the additional time it permits you to enjoy but for the opportunity of experiencing luxury unknown to even millionaires of past generations.

Rates comparable to those of Pullman car travel place the new means of transportation within the reach of those with modest incomes. Frequent schedules to all resort districts enable one to plan an itinerary to include places of interest formerly accessible only to those with considerable time at their disposal. And remember, air travel in itself is a real vacation.

EXPORTS OF AERONAUTICS PRODUCTS

(*Continued from page* 18)

prominence as a market for parts and accessories.

Belgium led 43 countries as the principal destination for engines, taking 41 valued at $357,792, of the 2,356 exported at a total valuation of $1,517,682. It is believed that some of these engines were re-exported to other European countries, since most of the Belgian planes are either British or locally made; few of them to date have been powered with American engines. The totals for 1931 to all countries were 318 engines at $1,474,785. The larger unit figure for 1932 is partially accounted for by the fact that Soviet Russia bought 2,010 engines at a total value of but $261,334. Most of these engines were of 1917 and 1918 production and available at low prices due to being of a type not employed in the United States for several years.

Twenty-four modern engines were sold to Soviet Russia during the year and are now used on the airliners on the Moscow-Berlin airline operated jointly by the Soviets and Germans. The Netherlands, the third most important market for engines, was the destination for 29 of them valued at $138,802. The Dutch airlines (both continental and to the colonies) are using a greater number of American engines then heretofore, the latest Dutch Fokker transport being designed around United States power plants. Sweden, Germany and Turkey followed the Netherlands as markets in order of importance. Sweden is using American engines on the latest airliners to be placed in service. Germany uses them to a limited extent, although Germany's engine imports are mainly for re-export in German planes. China, Sweden, Colombia and New Guinea are among the countries having German planes with United States engines.

Latvia entered the market for United States engines in 1932, taking five of them valued at $109,900. Argentina received during the year the first of a large shipment of high-powered engines for installation in aircraft made in the airplane factory at Cordoba.

Due to the growing importance of parachutes in the United States aeronautics export trade, they were given a separate export classification beginning with January, 1932. Formerly they had been under a classification for miscellaneous textile products. During the year $313,463 worth of parachutes and parts were sold to 16 countries. United States parachutes are now employed as standard equipment by over 30 foreign governments, including Great Britain, Poland, Greece and, beginning with 1932, Turkey. There are branch factories in England and Poland.

(*Continued on following page*)

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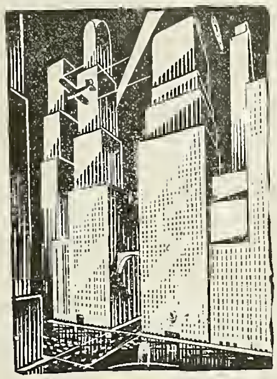

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(Continued from preceding page)

The growth of this important trade is largely the result of demonstrations in the use and care of the product by traveling representatives.

RADIO AIDS FOR FOG LANDINGS

(Continued from page 17)

In case the airway radio range-beacon is of the visual type, the same medium-frequency receiving set, automatic volume control, reed converter unit, combined instrument and distance indicator as required with the runway beacon are suitable for receiving the course indications from the airway beacon. The "land-flight" switch is then used in the "flight" position so that the horizontal pointer of the combined instrument reads volume, while the vertical pointer gives the course indications. The scale divisions of the distance indicator will correspond to distances of the order of 15 miles rather than of one mile as with the runway beacon.

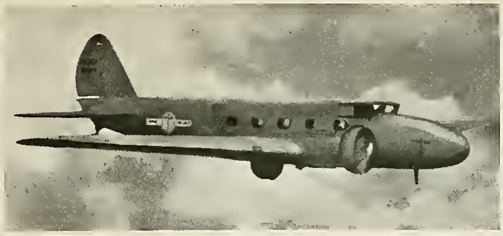
In the course of nearly three years of experimental flights on this system at College Park, considerable information on its performance has been accumulated which indicates the degree of precision attained. The following discussion gives a brief summary of the performance data together with indications as to what the performance requirements are likely to be in practical use of the system at commercial airports.

Because of obstructions in the approach at College Park it was found necessary to provide a very precise and sharp runway localizing course. The transmitting and receiving equipment were so adjusted that, at five miles from the beacon, a deviation of the airplane from the course of approximately 200 feet could readily be detected, while at a distance of one-half mile, a deviation of 20 feet was easily discernible. The actual path of the beacon course was checked periodically over a lengthy interval of time and found to be fixed regardless of such factors as weather conditions and ground conductivity. To utilize the course sharpness available it was found necessary to adopt a directional receiving antenna on the airplane which compensated automatically for a tendency to "weave" or "hunt" about the course and thus facilitated holding accurately to the course. The desired compensation was secured through the addition of an inclined wire running from the top of the vertical pole antenna back to the rudder fin. (See Figs. 3 and 4.)

Obstructions in the approach at College Park also necessitated close control of the landing path. To secure a suitable landing path it was necessary to clear a house chimney, approximately 1500 feet from the edge of the field, by about eight feet. The necessary fixed landing path was obtained by maintaining approximately constant power output at the landing beam transmitter and through the use of a landing beam receiving set having nearly constant amplification under all operating conditions.

The effect of variation of transmitter power upon the landing beam path is shown in Fig. 9. Graph A corresponds to the calculated landing path at the Newark airport for normal power output at the transmitting set. A drop of 10 per cent in power output would raise the landing path to that shown by Graph B, while a 10 per cent rise in power would lower the landing path to that shown by Graph C. It is seen that at three miles from the landing beam transmitter, a change of 10 per cent in power would result in a change of about 30 feet in an altitude of 630 feet,

(Continued on following page)



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The present Private Pilot licenses expire June 1st, 1933. All of them do! Less than two months remain in which about 12,000 Private Pilots can prepare themselves for the requirements of the new test . . . or else lose their passenger privileges. This new regulation calls for 50 hours in the log plus the same flight test as prescribed for transport pilots.

The average Private Pilot has about 25 hours . . . and he's not so hot on 200 ft. landings, tight verticals, recovering from stalls, spins, etc. He needs both dual and solo time. Some of them plenty of both. Yet, if each applicant needed only ten extra hours, a total of 120,000 hours will have to be flown. At an average price of $10.00 per hour, a total of $1,200,000.00 must be spent if these 12,000 Private Pilots are to retain their rating. How does all this affect *you?*

1.—If you're one of the 12,000, you'll probably need some flying time. Ten hours would cost $100.00 . . . unless you're lucky enough to have an Aeronca Trainer in your town. That's a lot of money to hand out—yet, it costs the operator nearly that much to keep you in the air ten hours with the average biplane. If he thinks it doesn't, he's kidding himself . . . because we can prove that $7.00 an hour for an Aeronca gives him more actual net profit. You'll be saving money for yourself—and the operator—by getting an Aeronca on your field right now.

2.—If your operator can't or won't give you this break, you might get a half dozen other Private Pilots lined up on the Flying Club idea. Six people can pool the funds they would have to spend on flying time and get an Aeronca of their own. There isn't a better club ship in the country because you can fly it for 1500 hours at about $2.50 per hour . . . which pays for the gas, oil, maintenance, depreciation and hangar rent. We have full dope on deferred payments, club organization, operation, etc. And our plan is so arranged that the operator in your town gets into the picture in a manner which means profit to him and to the club. Now, if ever, is the time to get it started.

3.—If you are an operator, you have the chance of a lifetime to get going in a big way. All your students are being forced up to the old L. C. class if they want to share their flying pleasure with friends. The demand for time has been doubled and trebled. You can keep your ships flying at least twice as much—if you have the kind of ship your students can afford to rent. An Aeronca is what you need. Scores of Aeronca operators are all set to double their last year's income which in many cases averages $100.00 per week. You can be one of them—by acting now. Full details upon request.

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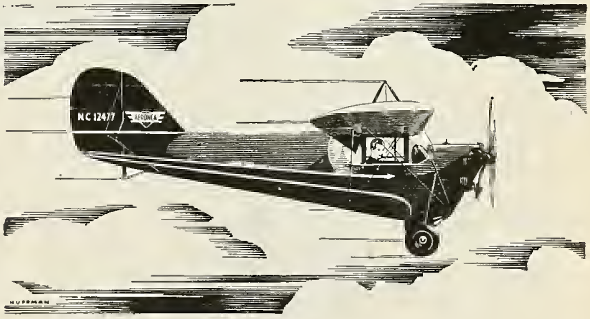

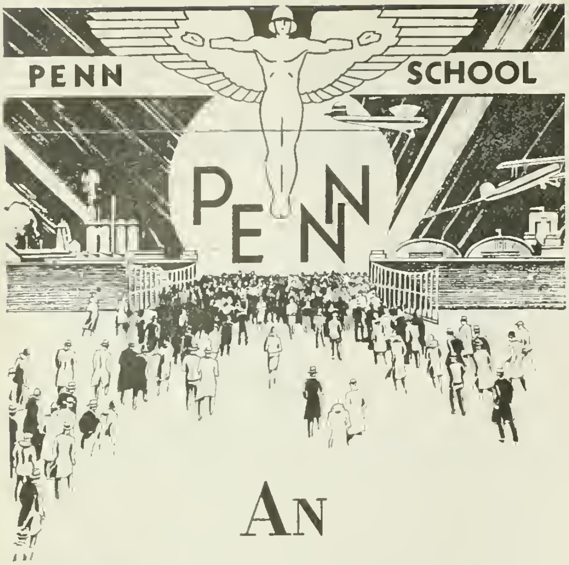

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(*Continued from preceding page*)

an increase in power giving a decrease in altitude and vice versa. At two miles, the change in altitude would be about 15 feet in an altitude of 280 feet. Over the far marker beacon it would be about six feet in an altitude of 100 feet, and over the boundary marker beacon, about four feet in 45 feet. The data presented in these calculated graphs have been verified experimentally. Experience indicates that, in practice, the output power of the landing beam transmitter can be readily maintained to within ± 5 per cent, so that the resultant change in steepness of the landing path will be negligible.

The effect of variation in the constancy of amplification of the landing beam receiving set upon the landing beam path is about double that given in the foregoing for transmitter power variation; i.e., a 10 per cent change in the receiving set sensitivity produces twice the change in the landing path that results from a 10 per cent change in the transmitter power. The Research Division of the Aeronautics Branch has designed a simple receiving set for this service the sensitivity of which remains constant to within a few per cent for all changes in applied voltages and aging of tubes and other component parts encountered in practice. The sensitivity is constant for all filament voltages ranging from 10 to 15 volts and for dynamotor supply voltages ranging from 100 to 250 volts. The variation of amplification with the life of a tube is negligible until the tube begins to lose emission. Reasonably frequent checking of the landing beam receiving set is therefore all that is necessary to insure a proper landing path. Once the landing path for a given airplane has been adjusted by means of the glide angle adjustment, this adjustment should be locked and the corresponding receiving set sensitivity measured. This is done through the use of a signal generator which is connected to the input terminals of the receiving set and the output voltage of which is varied until the "on-course" deflection is obtained on the horizontal pointer of the "combined instrument." The voltage corresponding to this deflection is then employed as a standard to which the receiving set is adjusted in future checks.

The accuracy of the runway localizing beacon and landing beam paths as found in the flight tests at College Park has proved more than sufficient for the actual requirements anticipated in the practical use of the system.

AERIAL MICKEY MOUSE CLUB

(*Continued from page* 19)

sardine can, getting fish oil on his whiskers. He is practising rapid exits from a submarine, in the event of its sudden plunge to the bottom. Sir Jujube will be just abaft the conning tower with his hand on the hatch, ready to cry, "Abandon ship! What ho for the life boats and the lecture tour. All off—this car going down!" He's a great fellow, Sir Jujube; many people take him seriously, but he's merely living in a spirit of fun, like his adventuresome contemporary of the screen, Mickey.

But look, my friends, here's Mickey and Minnie Mouse from 'Ampstead 'Eath, or maybe 'Ammersmith, in dear old England—Mr. and Mrs. Jollison, who got married recently and then flew off rapidly in different directions. The problem confronting the press is to procure a photograph showing them both together, without an ocean between them. This is a really modern marriage—love, honor, and on your way; see you a month later in the news reels from

(*Continued on following page*)

for *Happy Landings . . .*

Install at center of circle. Simple in construction and operation. Turn on the switch at the operations office when you want this apparatus to work and it automatically starts a predetermined volume of smoke at the center of the circle. When the switch is turned off it automatically cuts oil supply and ceases to make smoke.

This method of indicating wind direction at the ground and not 30 to 50 feet in the air, gives the exact direction to the pilot who is landing his craft, and gives it at the exact second he touches on the ground. Any ship landing can roll directly over the apparatus without damaging either the ship or the apparatus.

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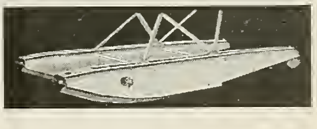

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STINSON AIRCRAFT CORPORATION
WAYNE . . . MICHIGAN

(Continued from preceding page)

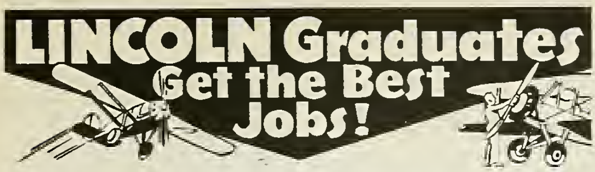
South America—if they send them to Cape Town. Pip-pip and cheerio, old bean! I don't know why we bothered getting together for the wedding ceremony—we could have made the responses by wireless, and I could have stayed in Mumbo-jumbo, British East Africa, while you could have remained in Namby-pamby, Patagonia. Many an old married man wishes now that his wife was a long-distance flier—and many a wife wishes her husband would hop over an ocean—or even into it.

Well, we've had lots of Mickey Mouseing around the surface of the earth and over the surface of the great waters, but here's a gallant fellow with a new idea. He isn't going along, he's going *up*. The Marquess of Clydesdale is his name, and the jolly old horse is going up to take a snapshot of Mount Everest in the Himalayas, the highest point on the earth's crust. Anyone of lower social rank than a Marquess would simply get an airplane good for that altitude and go after the picture. But not the Marquess. Not only must he take a picture of the mountain, he must have another machine taking a picture of him taking a picture of the mountain, and still another one to take a picture of the machine that is taking a picture of him taking a picture of the mountain, if you follow me. Besides, if he lands there by mistake, it's as well to have another airplane handy, as it's a long way down. It is, to be brutal about it, a hell of a long way down, and the air up there is drier than Bishop Cannon. (Speaking of him, by the way, that old Smoothbore isn't any too happy these days. No Sir, the old Howitzer, or Trench Mortar of the Dry forces is not happy at all. Like Hamlet, he remarked, "To beer, or not to beer," and it was to beer.)

Now, what I suggest is that these various aviating spirits who bask in the moonbeams from the larger and more lavish lunacy should combine into a club for the exchange of ideas and congratulations. The Aerial Mickey Mouse Club would be a good name. Such generous and adventuresome, by proxy, spirits as those who have backed up these various Mickey Mouse expeditions would, I am sure, be glad to endow the club. And Walt Disney would be only too happy to send them a picture of Mickey, their patron saint, to hang in the rotunda.

I'll even send them a picture of myself, for, now that I come to think of it, I, too, have done a trifle of Mickey Mouseing, bearing a banner with this strange device, "To the Rescue, men!" You've probably forgotten about it, because it's many years ago, but when two unfortunate pilots from France attempted to fly the Atlantic and were supposed to have fallen in the interior of Newfoundland, I was one of three hopeful spirits who flew up to that God-forsaken country looking for them. However, the company of former searchers after lost aviators is a large and practically anonymous one, unworthy of notice. Let them rest in the oblivion they so richly merit.

But this Mickey Mouse Club must be started at once as an inspiration to us all. They are a gallant band, and I like them and their amusing antics enormously. They now neither help nor hinder aviation, any more than Mickey Mouse himself helps or hinders his useful brethren of the wheat fields. They are, in fact, a class of jolly adventurers, sailing the skies in their own lunatic right, doing what they want to do. They are glorified Cook's Tourists seeing the world gratis, and doubtless having a lot of fun doing it. More power to them, one and all; and every bit of luck they need.



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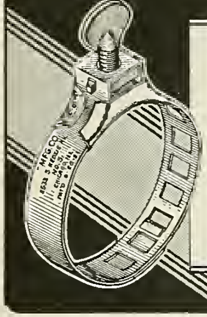

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DON'T BUY ANYTHING until you get Ort's 1933 Aviation Material Catalog. Prices are lower. Send one thin dime today. Karl Ort, 671 W. Poplar St., York, Pennsylvania.

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SZEKELY REPLACEMENT CYLINDERS: Drop forged from 1050 S. A. E. steel. Machined all over. Weight one pound less. Guaranteed against failure. Moller-Walton, New Canaan, Connecticut.

FOLMER GRAFLEX aerial camera; model A-1; ten-inch Kodak f4.5 lens; 4 x 5 film magazine; fine condition, $100 cash. Dormand, Riverhead, New York.

SACRIFICE PRICES on new and used Eaglerocks and Flyabouts, aeronautical supplies and parts. Expert repair work our specialty. Aircraft Mechanics, Inc., Alexander Aircraft Factory, Colorado Springs, Colorado.

FOR SALE OR TRADE: Wright Whirlwind J-3 200, serviceable, less wiring, $85. New 300 Hisso, complete less wiring, $80; 2 slightly used, less magnetos, carburetors, $25. Used serviceable 150 Hisso, $35. Used serviceable Liberty 400, complete, $55. Used Curtiss T-2 12 cylinder, 525 h.p., incomplete, $25. Warner Scarab Jr., 300 hours, no time since overhaul, $285. Hamilton Steel propeller, suitable 90-125 h.p. motor, newly serviced, $95. Hamilton Steel propeller for J-6 300, new blades, $175. Skis approved for gross 2100, nearly new, $45. J6-9 exhaust collector ring, $65. Scintilla magneto for 7-9-12 cylinder, $35. Bosch magneto, 3-6 cylinder, $25. Splitdorf switch, new, shopworn, $2.50. Curtiss-Wright Jr. parts; ailerons uncovered, $10; spars, $7.50; tail surfaces covered, $50; set control cable, $12.50; axle, $12; fuselage, repaired, licensed, $150; wheel, tire, tube, $15. Bull Pup parts: wheels, tires, tubes, 7x4, $13.50; set flying and landing wires, $25; wings uncovered, $50; 30x8 tires, tubes, $10. Heath welded steel fuselage, $25. Szekely used parts, 50% off list: 3 new late type cylinders, less heads, $22.50. J-4, J-5, J-6, Cirrus and Velie parts, 60% off list. Motor mount, less ring, Laird LCB, $35. Waco and Travel Air 2000 parts, cheap. Obenberger Aircraft Works, 2940 West Pierce Street, Milwaukee, Wisconsin.

FOR SALE: New and used wings, all licensed by licensed repair station. Write us for particulars. New London Aircraft Co., Inc., New London, Ohio.

SET 64 new OX-5 gaskets, $1 postage paid. Y pipes, $2.50. New hubs with bolts, $2.50. New Consolidated Jones tachometer, $8. Pioneer 355 altimeter, $9.50. Reiker climb indicator, $4. Bubble bank indicator, $1. Set new con and main bearings, $3. Knute W. Olson, 3504—16th Ave. So., Minneapolis, Minnesota.

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CENTER SECTION Eaglerock, right lower, both uppers, $50 each. Travel Air 2000 uppers, $40. Great Lakes right lower, $70. Waco 10 left upper, $25. All licensed, uncovered, perfect. OX-5 Travel Air, excellent, licensed, $400 less prop. Other parts. Beebe Aircraft Service, Muskegon, Michigan.

Wanted To Buy Or Trade

WANTED: Salmson AD-9 40 h.p. engine. Also propeller and oil tank for Aeromarine Klemm AKL25. Will pay cash. V. D. Schurr, Linfield, Pennsylvania.

WILL TRADE 1932 Plymouth Coupe, radio, heater, low mileage, for two- or three-place licensed plane. Pay some cash. Theo. Rousseau, LaPlant, South Dakota.

HAVE single place Aeronca, perfect, $250 cash. Flyaway New Jersey. Wanted: Parachutes, American Eagle lower wings, Wasp, J6-9, Standard Steel propeller hubs. AERO DIGEST, Box 1513.

TRADE Ford "B" standard coupe, 9,000 miles, and cash difference for licensed two-place air-cooled ship. Curtis Moore, Alpine, Texas.

25 ACRE Blaisdell Lake lot, 1300 foot frontage, $1400; or will trade for licensed NB Trainer, or Aeronca, and cash. Box 162, Winter, Wisconsin.

WANTED: Used Szekely motor, 45 h.p.; also air-cooled two-place Trainer. Rising Sun Motors, H and Luzerne Streets, Philadelphia, Pennsylvania.

WANTED FOR CASH: Two- or three-place licensed open cockpit job. Give full particulars and lowest cash price. Must be cheap. C. A. Royston, 720 West End Avenue, New York, N. Y.

WANTED: Bird, 100 or 125, with 19-stud front exhaust cylinder head. Ship and motor must be in good condition. Give full particulars of ship and motor, and lowest cash dollar. Coy Page, 1111 Commerce Street, Lynchburg, Virginia.

WANTED: Great Lakes 2T1, Fairchild "22", Bird, Davis or similar ship. Give full details and lowest cash price. Frank Arndt, 3265 Oakland Avenue. Milwaukee, Wisconsin.

WANTED: Limited Commercial pilot, with A & E license, having some money to invest. Box 134, Central Islip, New York.

WANTED: Crack-ups, or jobs needing recovering. Write in detail, extent of damage, type of engine and price wanted. Boyers Airport, Inc., Melbourne, Kentucky.

WANTED: Parts for Kinner B-5 3-place Travel Air 16K and B-5 crankshaft. W. M. Marks, 525 South Perry Street, Montgomery, Alabama.

WANTED: 40 h.p., model E113 Aeronca motor and prop. Must be cheap for cash and in good condition. Address: Box 561, Montgomery, Ala.

WANTED: Warner or Lambert Monocoupe. Give complete description, model, when licensed, equipment, condition, and price first letter. Post Office Box 1115, Great Falls, Montana.

WANTED: Arrow Sport, N-B Trainer, Velie Monocoupe, Aeronca or similar light two-place job; also a light single place job. AERO DIGEST Box 1517.

HAVE CASH waiting for best buy in 2-, 3- or 4-place ship. Answer quick. Carl Hanson, Municipal Airport, Youngstown, Ohio.

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An airport manager and aircraft dealer writes:

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CLASSIFIED ADVERTISEMENTS

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SELL OR TRADE: Waco 9, 20 hours since newly covered. Special streamlined landing gear and fuselage. Want Aeronca, Rearwin Jr. or Eaglet. B. Fairchild, care of Palace, Monroe, Louisiana.

WANTED: Avro-Avian left lower and right upper wings, with right rear wing strut; also prop. Leser, 187-10 Hillside Avenue, Hollis, New York.

WANTED: Stinson, Ryan or similar ship. 5000-hour Transport Pilot with clean record can make money for owner of this type ship on a 50-50 basis. AERO DIGEST, Box 1518.

WILL TRADE several beautiful diamonds for three-place air-cooled ship or Stinson Jr. J. T. Hutchins, 417 North Seventh Street, Temple, Texas.

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PARACHUTES: Approved type. Seat, back, lap and chest; bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

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GRADUATE OF GREAT LAKES Naval Aviation Utility School desires position at airport in California vicinity. Two years experience on air-cooled engines; 100 hours flying time. Salary expected. W. W. Harvey, Lenox, Massachusetts.

SALESMAN-TRANSPORT PILOT: With cabin airplane. Ten years sales and executive experience. Familiar with airport management. Desire connection in sales or advertising capacity with corporation. Married. Excellent references. AERO DIGEST, Box 1502.

MECHANIC: Both licenses, 15 years' experience, factory, field, transport; construction, repair, overhaul, handle tools, supervise, or both. College education; anything anywhere. AERO DIGEST, Box 1508.

TRANSPORT PILOT: Licensed mechanic. 685 hours, day and night, all weather. Excellent record, best references. Sober, dependable. Age 25. Go anywhere for steady employment. Robert Norris, Marquette, Kansas.

TRANSPORT PILOT: Age 29. 4800 certified hours, 7 years' experience on all types of ships. Instructor's rating, A. & E. license. Experienced in airline, cross country and student instruction. Knows aerial navigation and meteorology. Desires connection with airline, private corporation or individual. Single. Will go anywhere. Excellent references. AERO DIGEST, Box 1511.

L. C. GRADUATE Von Hoffman, St. Louis; 22, single, over 200 hours barnstorming, experienced gasoline engine mechanic. Go anywhere. Own 2000 Travel Air needing repairs. James Stuart, Logansport, Indiana.

LICENSED A & E MECHANIC: Navy trained, shop and line experience. Seven years experience; single, will go anywhere; excellent references. AERO DIGEST, Box 1515.

TRANSPORT PILOT: 6 years' experience managing-owner airport and school; 12 years other executive experience; desires position with municipality or commercial corporation as airport operator, and would consider leasing airport with hangar and shop facilities. AERO DIGEST, Box 1516.

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WANT TRAINING for Private Pilot's license, plus used light plane. Can come to your field. Must be bargain. James Denton, Naval Station, Guantanamo Bay, Cuba.

WANTED: Reliable representative in each section of the country to assist large airline operator in the sale of surplus aircraft, engines and equipment. To an experienced man we believe that we can offer a unique and profitable proposition. AERO DIGEST, Box 1501.

PRESENT FIELD MANAGER and instructor of firm ceasing operations desires connection with firm or individual. Over 1,000 hours, day and night cross-country and blind flying experience. AERO DIGEST, Box 1507.

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LOWEST PRICES on repair or recovering work consistent with expert workmanship. Let us submit an estimate. Department of Commerce Approved Repair Station. Aircraft Mechanics, Inc., Alexander Aircraft Factory, Colorado Springs, Colorado.

LOW PRICES, SUPERIOR workmanship: Ships rebuilt and repaired. Approved ribs and spars manufactured. All wood and metal parts duplicated from blueprint or pattern. Pioneer Aircraft Co., Approved Repair Station No. 118, Teterboro Airport, Hasbrouck Heights, New Jersey. Phone Teterboro 8-0747.

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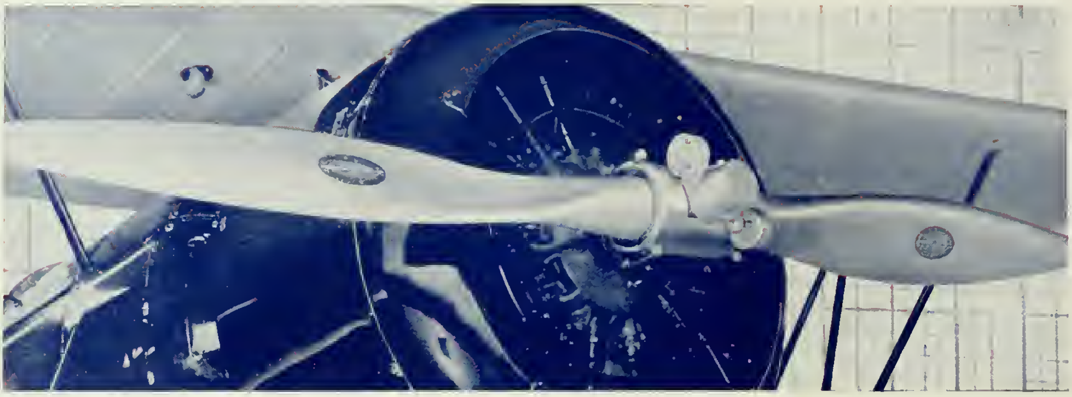

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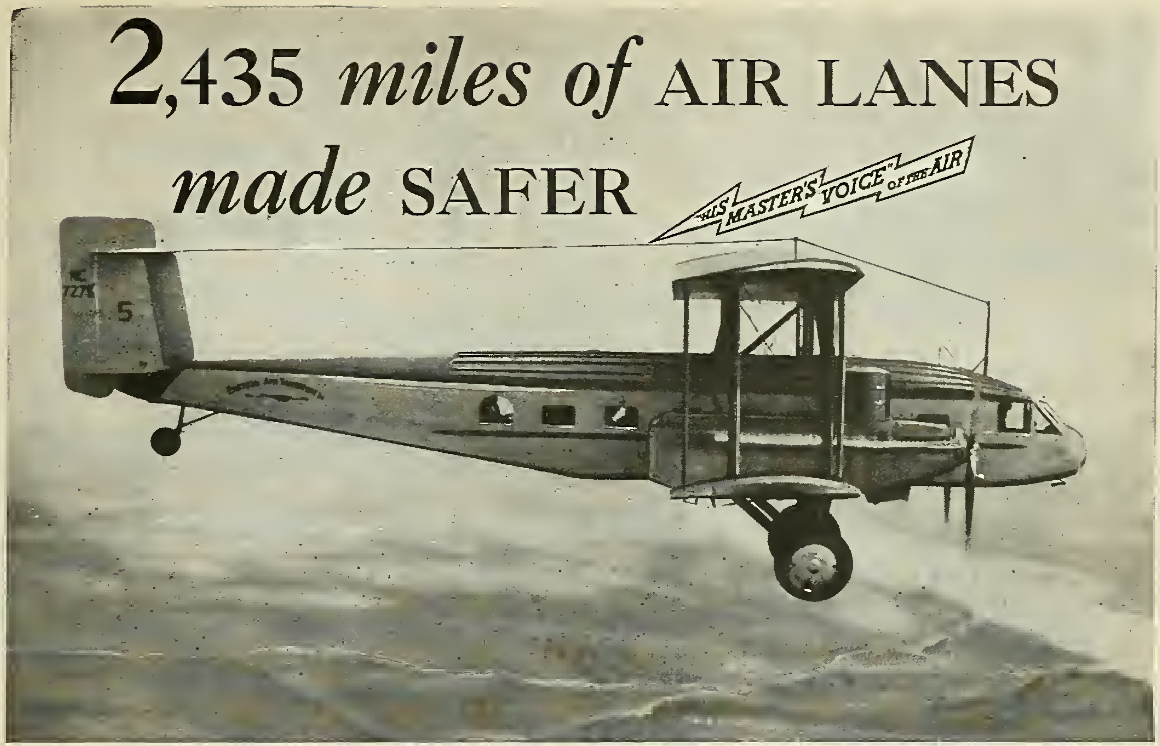

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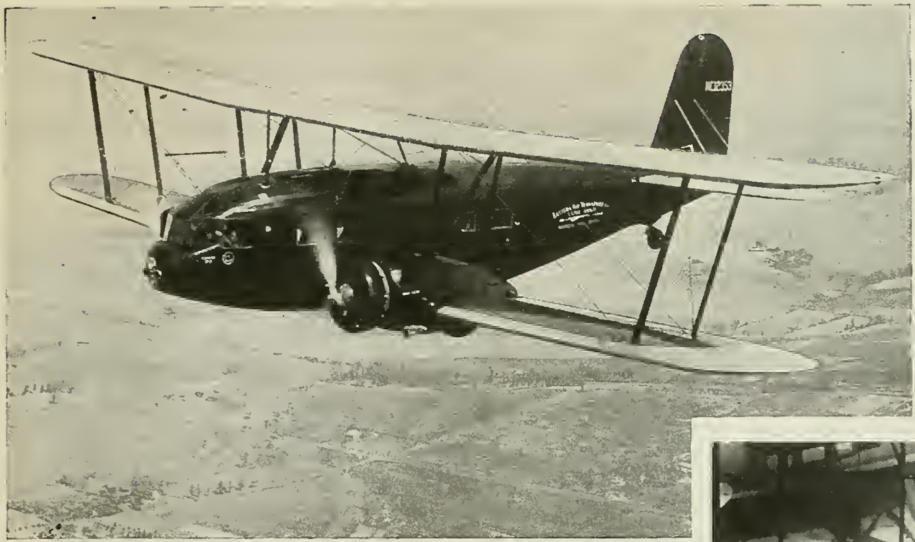

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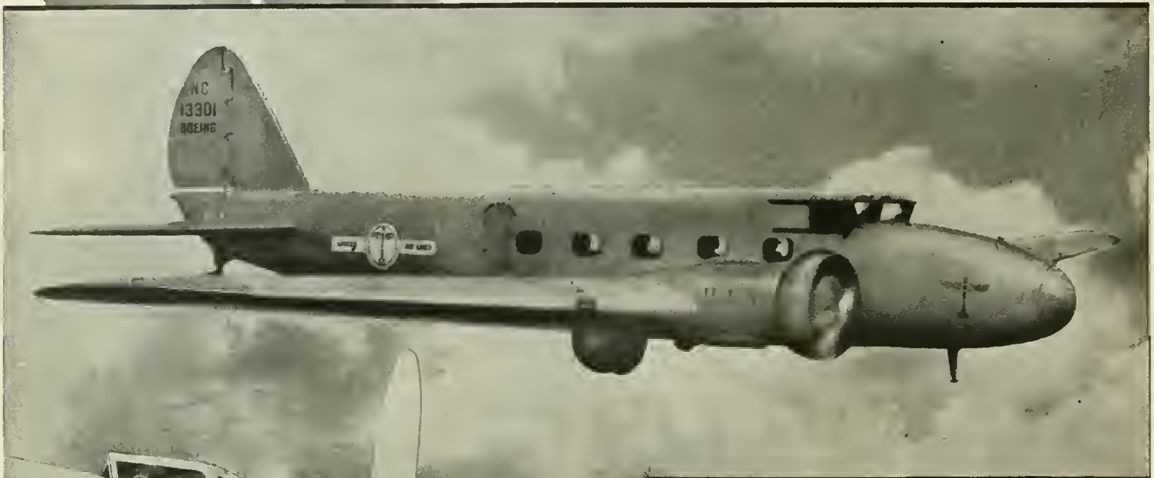

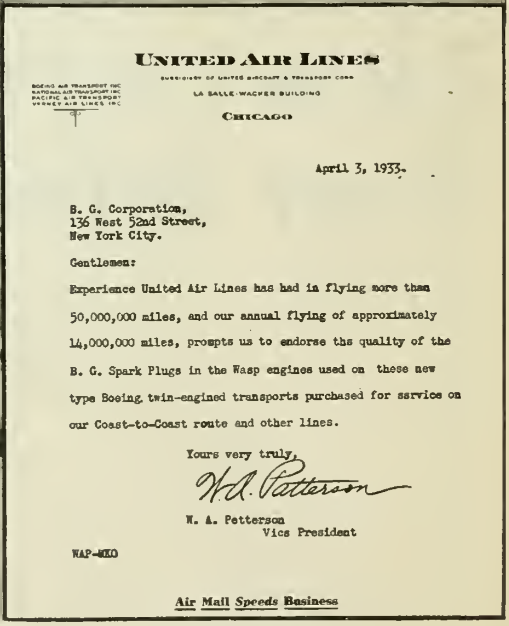

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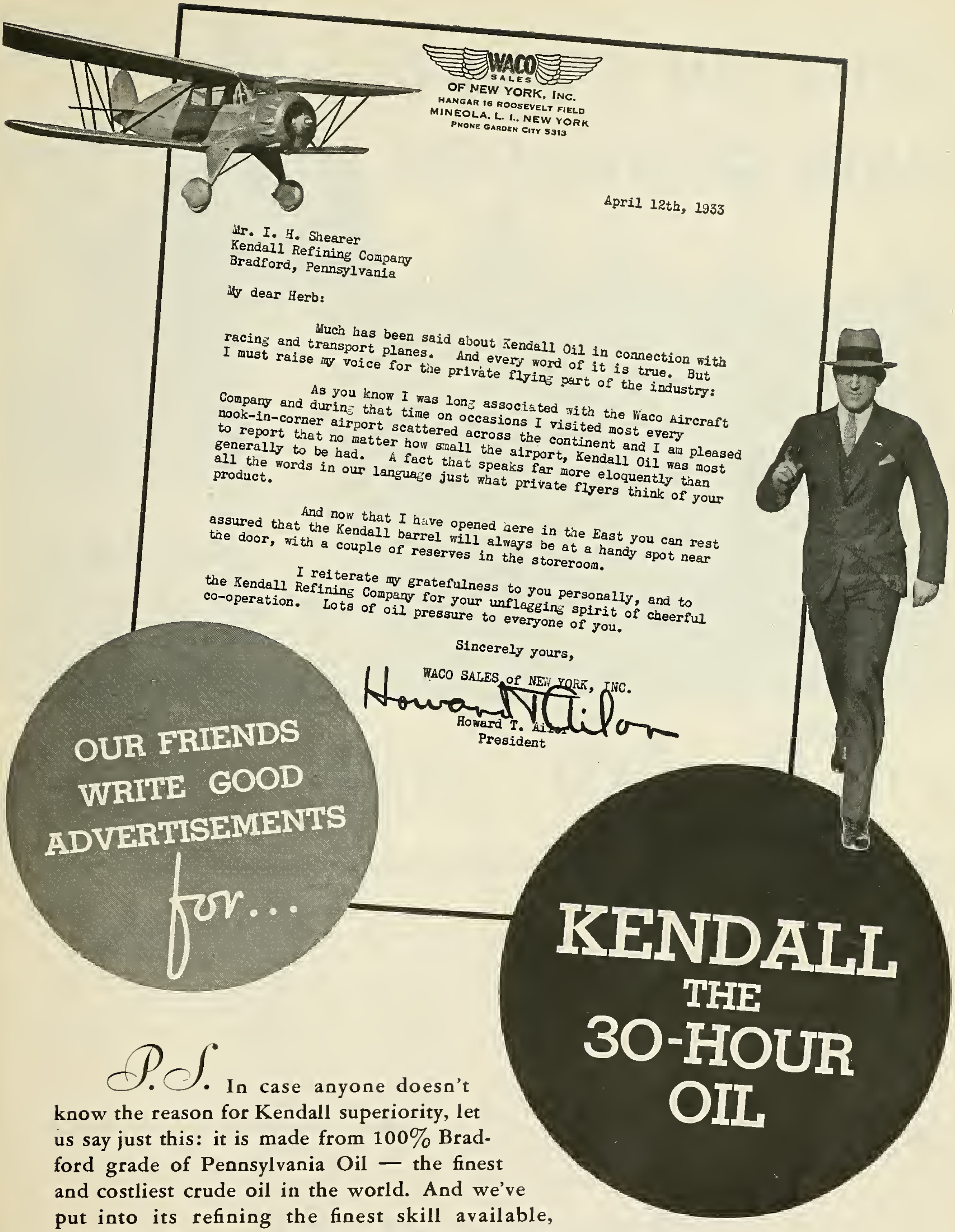

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AERO DIGEST

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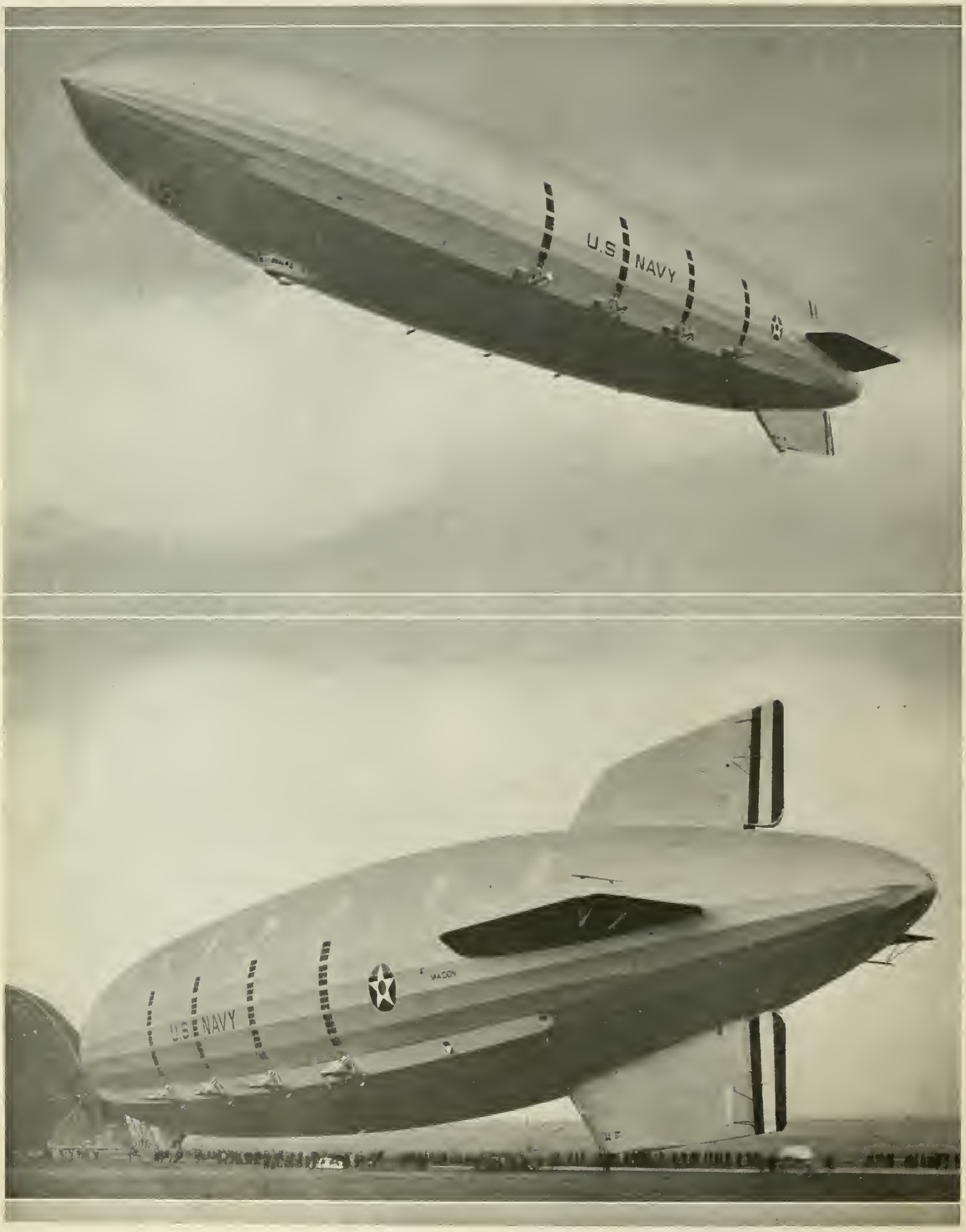


Upper photo: P & A; lower: Goodyear Zeppelin Corp.

With 105 passengers aboard the new *U. S. S. Macon* leaves her dock at Akron to soar over northern Ohio and Lake Erie, on her maiden voyage

"UP SHIP!"

By

Cy Caldwell

CARRIED down into the waters of the North Atlantic with the wreckage of the U. S. S. *Akron* are many of the high hopes of the lighter-than-air enthusiasts. Not alone in this country, but throughout the world, and especially in Germany, the question is asked of those brave spirits who ride the skies suspended beneath a bubble, "Is your game worth the candle?"

As Al Smith would say—"Let's look at the record." As an offensive weapon in war, the Zeppelin was proved to be impracticable, and before the end of the war its use for bombing purposes was discontinued. In 51 airship bombing raids upon England, 1,413 persons were killed, 3,408 were injured, and millions of pounds' worth of property was destroyed. But this damage was accomplished with a loss of 18 Zeppelins and their crews brought down by airplanes and anti-aircraft guns; eight Zeppelins were lost, destroyed or surrendered when returning from raids on England, and three Zeppelins were bombed in their sheds by English airplanes and destroyed. By 1917 the airplane had mastered the Zeppelin.

The loss of four Zeppelins by fire in their sheds in January, 1918, ended the use of Zeppelins as bombers, and thus should have ended the use of hydrogen as a lifting element. Due, however, to the unavailability of an adequate supply of helium, it was necessary to continue the use of hydrogen. Man learns by experience what is best to do, but often in his progress he is retarded, not by his lack of knowledge, but by his limiting necessities. The *Graf Zeppelin* uses hydrogen because only hydrogen was available at the time it was built, due to financial necessity—which also dictated the use of hydrogen in the English R 101 that crashed and burned at Beauvais, France, Oct. 5, 1930, and thus marked the end of yet another airship service.

I have flown as a passenger in three hydrogen-filled airships: a Royal Air Force training blimp, the British NS 11, a week later lost by fire over the North Sea, and the old English dirigible No. 9, later dismantled. These flights were made from Cranwell Aerodrome while I was instructing there in night flying in 1918. Today I would not leave the ground in any airship filled with hydrogen—and that includes the *Graf Zeppelin,* which has a truly impressive record for safe passages, making some 280 flights and covering over 300,000 miles in a flight around the world, a return flight over the North Atlantic, and 15 return flights over the South Atlantic to Brazil. But the use of hydrogen is an added risk that passengers should not be exposed to when a non-inflammable lifting gas may be procured. The fact that the *Graf Zeppelin* is still in service does not obliterate my memory of dozens of other Zeppelins that have burned. Helium or nothing is my motto.

The history of the rigid airships since the war holds two outstandingly successful airships, the *Graf Zeppelin* and the *Los Angeles,* both German-built ships. The story of the English, French, Italian and American airships is a recital of disasters, several of which would not have resulted in such loss of life, had helium been used as a lifting element, or if heavy oil engines now under development had been available at that time.

There is no use shutting our eyes and pretending to ignore these disasters and the conclusions to be drawn from them by the committees whose decisions will affect the further progress of the lighter-than-air experiment, for who will assert today that it is in more than an experimental stage? We in this country have been too long and too often deluded with false optimism on many matters. Let us in this one face the facts. What have we learned?

We have learned that the Zeppelin is useless as a bomber, that the use of hydrogen adds an unnecessary element of danger that may be avoided by the use of helium; that the structure of English- and American-built ships has failed to withstand the stresses of too turbulent air, and that the German ships, the *Los Angeles* and the *Graf Zeppelin,* have withstood very severe buffets. Whether the German airships encountered conditions as severe as those that destroyed the American and the English ships, or whether the German ships merely had better luck or better handling, is something that probably never can be determined. But one thing is certain: despite what seems a long record for failure, and a good record for some measure of success, not enough Zeppelins yet have been built and operated to determine with any certainty whether the rigid airship is any good or no good

The Germans built in all 127 Zeppelins; the Americans built three, and the English built five. The French built only one, from old German plans, and the Italians produced only semi-rigids. From the very beginning, therefore, less than 140 of these leviathans of the air have been constructed. Where would today's transportation business in airplanes, railroad trains and steamships be if we had built only 140 airplanes, locomotives and steamships? If we had stopped at the 140th airplane, locomotive or steamship, people would have been justified in saying that so far as we then had gone our experiments with airplanes, locomotives and steamships had been failures.

There is, I find, among airplane people, a tendency to belittle the rigid airship because it is as old as the airplane but has not yet proved its usefulness in peace and war. The 140th airplane produced had not at that time proved its usefulness for anything, except as something to stare at in amazement. The rigid airship certainly has advanced beyond that point. The *Graf Zeppelin,* for instance, hydrogen and all, has earned its way financially without a subsidy. Even our airlines can't say as much!

Today neither the Government nor the taxpayers are in any mood to spend money in the support of any service that cannot justify its existence and the use of public money for its support. If the rigid airship cannot justify its retention in the service of the United States Navy, it will be discarded; if Dr. Eckener's plans for commercial airship

(*Continued on page* 58)

NAVY TORPEDO and BOMBING PLANES

Major General James E. Fechet, U. S. Army (Ret.)

ON JULY 16, 1912, Bradley A. Fiske, an officer of the United States Navy, patented his invention of "a certain new and useful improvement in Methods of and Apparatus for Delivering Submarine Torpedoes from Airships" (airplanes). At the date of this patent airplanes were very flimsy and still considered as an experimental contrivance and certainly not capable of carrying the weight of a torpedo. Also, no torpedo had then been perfected which would practically and successfully sustain the shock of dropping from an airplane at the minimum speed of airplane flight or from an altitude safe for the plane and aviator.

The development of the torpedo plane to its present status has extended over a period of twenty years. However, when the fact is taken into consideration that the development of a torpedo plane could progress only as fast as the development of aviation as a whole, the time is startlingly short.

The conception of the idea of dropping torpedoes from an airplane, so far in advance of its practical application, is just one example of the farsightedness which has been displayed by personnel of the Navy in matters pertaining to the subject of aeronautical development.

The Navy's earliest attempts to procure a suitable type of torpedo and bombing plane were handicapped by the necessity of incorporating long-range characteristics (since it was necessary for these planes, until the advent of the aircraft carrier, to operate from shore bases) with the ability to carry torpedoes and the mechanism necessary to their launching; and to carry bombs, with their necessary bomb racks and sights.

In 1917 the R-6, a Curtiss biplane powered by an eight-cylinder "V" type, water-cooled Curtiss V2 engine, appeared on the scene. The designation of this plane was changed in 1919 to R6-L as Liberty engines were substituted.

Trials were carried out on twin-engined torpedo planes of the monoplane type in 1921. These planes were designed primarily for use as seaplanes. However, the development of the monoplane type gave way again to the biplane upon the introduction of the DT and the DT-2 in 1922, manufactured by the Douglas company and powered with Liberty engines. These planes were two-place, capable of a speed of 115 miles per hour, carrying a standard 1,700-pound Navy torpedo. The DT-2 was followed by the DT-4 and the DT-6. The Liberty engine during this time gave way to the Wright Model T-2 and the Packard Model 2500.

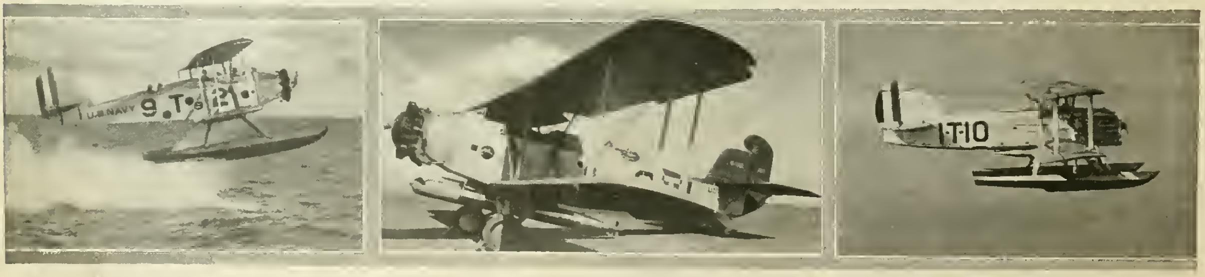
In 1923 the Curtiss CS biplane with a 600-horsepower Wright water-cooled engine appeared. This plane and the Martin SC were almost identical, and it marked the entrance of the Martin company into the business of manufacturing bombing planes in quantity for the Navy.

The T3M-1 and the T3M-2 with Wright and Packard engines were produced in large quantities during 1926 and 1927. These planes carried a great amount of equipment which had been found necessary during the preceding years of development.

The T3M-2 planes were the first torpedo planes to go aboard an aircraft carrier for operations. This occurred in September, 1928, when VT Squadron One embarked on the U. S. S. *Lexington* at Hampton Roads, Va., and were carried to the West Coast. The T3M-2's were the last of the torpedo planes powered with water-cooled engines in the Navy.

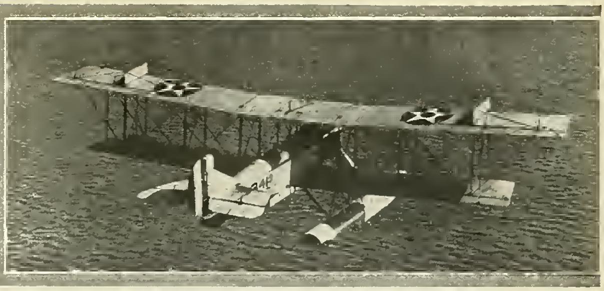
The T4M-1 was introduced in 1928 with its Pratt & Whitney Hornet 525-horsepower radial air-cooled engine. This engine gives a speed range of from 56 to 120 miles per hour with a service ceiling of approximately 10,000 feet. Many of the parts of this engine are interchangeable with the Wasp engines so extensively used in other types of planes aboard the carriers. This feature, therefore, makes possible the reduction of spare parts to be carried.

The T4M-1 was the first torpedo plane actually designed



Martin T4M-1 launching a torpedo, the Great Lakes TG-1 as a land plane and a Douglas D1 powered with a Liberty engine

Douglas DT of 1922



Curtiss R-6 of 1917

for carrier use. Although lighter in weight of structure than its predecessors, it is capable of carrying a 1,000-pound bomb or a torpedo, and a three-man crew.

The TG-1 airplane, introduced to the Naval service in April, 1930, is identical to the T4M in many respects and similar in the others. The difference in designation is due to the fact that orders for this type of plane were filled by two manufacturers; hence the T4M for Torpedo-Martin and the TG for Torpedo-Great Lakes.

These planes, the T4M's and the TG's, are at present the standard torpedo and bombing planes used by the Navy.

A large three-passenger fuselage gives a heavy appearance which is accentuated by the wide landing gear when operating in the landplane condition. When operating as a seaplane, the landing gear consists of two large floats attached by heavy vertical and diagonal struts. While in a seaplane condition the performance of the plane is somewhat reduced, but on the whole it is very satisfactory.

At the end of the fiscal year 1932 the Naval aeronautical organization allowed for 72 of the VT type of airplane. VT Squadron One and VT Squadron Two, attached to the U. S. S. *Lexington* and U. S. S. *Saratoga,* respectively, account for 36 of this number, while six were assigned to the Asiatic Fleet.

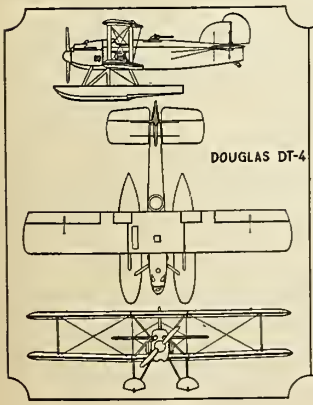
The torpedo and bombing planes are the largest type employed on the carriers. The primary mission of this type is to attack enemy heavy vessels or shore bases. As a secondary mission they may be employed for scouting purposes in areas where strong enemy air forces will be encountered. Because of the limited storage space aboard carriers it has been necessary to combine the functions of the torpedo plane with that of a high-altitude bomber. In many respects the functions of these planes may be compared to those of the major-caliber rifle and the torpedo tube. Their equipment for aerial combat consists of one or more machine guns for the purpose of defense. Ordinarily they operate under the protection of fighting planes, but when grouped in a compact formation they offer each other a considerable protection and constitute a very difficult target for hostile aircraft. With the improvement of anti-aircraft batteries, the necessary consideration has been given to the development of the speed and high-altitude capabilities in these planes in order that the essential element of surprise may be counted on.

When acting as torpedo planes they are generally protected in some measure in the way of smoke screen and deck strafing by airplanes working in cooperation to permit them to get within effective range. The number of ships over which they must pass and the low altitude of their approach makes a successful torpedo attack on the main body a hazardous and difficult task.

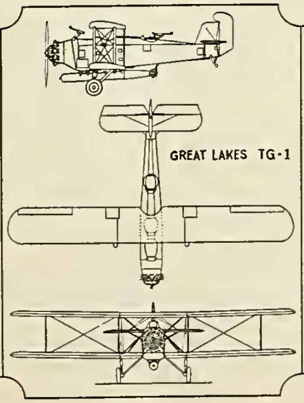
All torpedo planes are equipped to carry radio, and thus communication can be maintained with their base. This is important in that it permits the assignment of a mission to these planes while they are in the air or a change in their objective after the attack has been launched.

A bombing plane performs exactly the same basic functions that a gun performs; namely, hurling a destructive projectile against the enemy. The difference lies in the fact that a ship equipped with airplanes for this purpose can strike the enemy at approximately ten times greater range than is possible with ordinary gun fire.

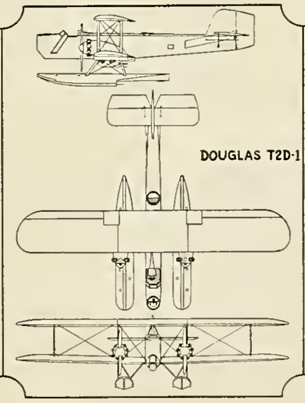
The torpedo plane is essentially a highly mobile torpedo tube. The surface torpedo vessel can deliver a torpedo attack only by placing herself and her entire ship's company in danger of destruction by defending gun power. With the use of torpedo planes the vessels to which they are attached may work well out beyond opposing gun range.



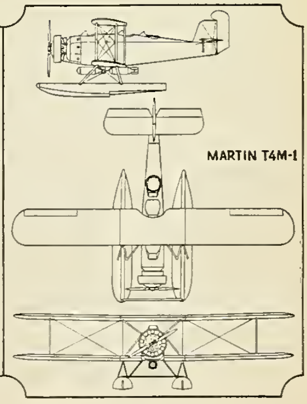
DOUGLAS DT-4



GREAT LAKES TG-1



DOUGLAS T2D-1



MARTIN T4M-1

AIR—HOT AND OTHERWISE

SPEAKING OF EXPERIMENTATION, MR. ROOSEVELT

By

Frank A. Tichenor

MANY of the commentators upon the wider aspects of the Roosevelt Administration refer to it as a new American Revolution. The only intelligent criticism which we have seen raises the more or less polite question of whether or not some of the President's plans are not, after all, experiments and, if they are, whether they will work. The President himself has referred to the experimental nature of some of his proposed undertakings. If it is true then that we are to have some governmental experimentation—and there can be no doubt that we could stand a little—how about the practical experiments long advocated here, and elsewhere, of a unified air service and a Department of National Defense?

AERO DIGEST is prepared to uphold the Roosevelt proposals of economy as they concern the Army and the Navy. It is only the short-sighted and the selfish who intend to oppose logical economies in the services.

Everybody is for economy—for the other fellow. The banker is for national economy, but he doesn't want any in the banks. The farmer is for national economy, but he wants a big pork barrel for himself. The manufacturer is for governmental economy, yet he wants a continuance, at heavy expense to the taxpayer, of all those pseudo investigating and information bureaus of the government to do work for him which he should do for himself—at least in times of economic stress.

AERO DIGEST feels that it takes at least a unique stand in not joining the selfish squawkers who, now that national economy is upon us, plead that it be practiced only on the other fellow.

President Roosevelt, in his proposal to consolidate bureaus and functions of the Department of Commerce and the I.C.C. to create a single bureau for transportation to take care of water, rail, air and roads demonstrates that he sees the possibility, and the plausibility, of making one organization do efficiently the work now being done lazily, haphazardly and selfishly by two or more.

Where can the truth of this so-called experiment be better demonstrated than in the Army and in the Navy? Though we are ready to admit that there have been plenty of occasions upon which both the Army and Navy have demonstrated that they weren't working to a common end and purpose, we believe that the average honest, but poor, taxpayer is of the opinion that the basic purpose and the sole aim of the Army and the Navy is National Defense. Well then, why not one bureau to that one end?

It should lead to the elimination of a lot of useless under secretaryships, bureau heads and red tape—things which both Director General of the Budget Douglas and President Roosevelt have shown clearly enough that they believe should be eliminated.

And if it can be thus demonstrated that there never was a more opportune time for the achievement of a Department of National Defense, the same truth holds for a unified air service.

The old protest that the naval air interests and the Army Air Corps interests never work to cross-purposes—thereby creating duplication and waste of effort and money—will not go, and it must not go. Just within the last month, we have seen the spectacle of the Army and Navy competing to see which could fix up the prettiest plane with pilot attached always to be at the disposal of the President. Although it may not appear to the brass hats that this is a ruthless waste of money, the embattled taxpayer is not missing the point.

But there is more to it than that one point—and the waste and duplication alone are bad enough. There is a reason why neither Army nor Navy thought can concentrate on the idea of waste involved in this situation of providing two airplanes where one would do. The point here as the service men see it is one of *service propaganda.* The President continuously flying in Army piloted Army equipment could hardly fail to come to see all of the good points of Air Corps aviation, and perhaps see many of them to the disadvantage of naval aviation. Not to do this would be neither human nor natural.

Viewed in this light we begin to appreciate why it is necessary for the Army and Navy to enter into this expensive little war of duplication. Service propaganda requires it. Under these circumstances the Army Air Corps would be considerably less than loyal to Army aviation interests if it failed to follow the Navy in tricking up a special plane with the Executive seal and detaching a pilot from regular service for this special air chauffeur job.

But this whole ridiculous demonstration of copy-catting would go if there were no necessity to maintain service propaganda, of which this is one prime and unique example. And that necessity would not exist if we had one unified air service.

It is inevitable that as we become re-engaged once more with the practical side of a unified air service idea that we shall hear raised anew the old discordant cry, "But who shall lead us?" "Not an Army officer—not on your tintype," screams the Navy. "Not one of those sea-going taxi drivers," yells the Army.

Under the set-up of a National Defense Bureau we should have one under-secretary for air—a civilian head.

Perhaps in the past the claim could be made that there was not available a man of sufficient air training and the qualities of leadership to occupy this important post. But that claim cannot be maintained today. We know of no one who would be better qualified and—the rivalries of the Army and Navy beside the point—who should be more acceptable to the Army and Navy, than Clarence M. Young. We submit that Colonel Young's record as head of the Bureau of Aeronautics, a bureau which may now have to be eliminated through consolidation and in honest national economy, ably qualifies him for the task.

Nothing could be more disastrous to American aviation

(*Continued on page* 58)

EDITORIALS

Admiral Moffett

AMERICAN aviation, and particularly those related factors of flying which are concerned with the building up of our air power at sea, will not immediately appreciate the full loss which has been sustained in the death of Admiral Moffett.

This must be so because Moffett's services to aviation covered so wide a field, and because those services were so unselfishly and unostentatiously rendered that few were privileged to comprehend their extent. It can only be in the passage of time that the real picture of the man's contribution to aviation will be universally appreciated.

Admiral Moffett has been praised as an aviation enthusiast. But he was an enthusiast with vision. Few who came in contact with him and none who have commented upon his work since his tragic death missed the value of the factor of his enthusiasm. But this enthusiasm would have meant little that was practical if it had lacked vision and direction.

And it was an enthusiasm devoid of sentimentality. Ever a kindly and thoughtful man of the sea, Moffett consistently ruled out all sentimentality in his control and direction of naval air policies. It is perhaps ironic then that many of the bewildered and grief-stricken commentators upon the Akron tragedy should insist that the reason that America's airship program must not now be given up is because such abandonment at this time would be a violation of the faith and trust of the men who went down with the Akron.

But Admiral Moffett's interests and enthusiasms for the air were never based so exclusively in emotion. He believed in the rigid airship. He had faith in the work which it could do in the scheme of national defense. His own recommendation to abandon, or to continue indefinitely the work of dirigible development would have come only from the discovery of some set of hard, incontrovertible facts. Such a discovery might have come as the result of tragic accident, or in the course of unexciting and routine laboratory work. But the occasion for the emotional or unemotional discovery of such facts would have made no difference to Moffett. He possessed an honesty and integrity which did not permit the mixing of sentiment with his life work. And here is one factor of his character which makes it difficult to fully appreciate his loss to aviation.

The method of his labors was another striking attribute of the man. The honor of being the father of his country's naval aviation was not bestowed gratis with the office of chief of the Navy Bureau of Aeronautics. It came only as a reward of the method and manner of his approach to his great task. His work as the representative of naval aviation on the Hill required both tact and tenacity. It was never in any sense a soft berth. Because of the confusion of mind, and, in some instances, the wilful blindness of many of his associates in the Navy concerning aviation he frequently had to fight alone, and more often than not it was an action waged on two fronts.

AERO DIGEST in extending congratulations to Captain King upon his appointment as successor to Admiral Moffett cannot refrain from pointing out the difficulties of the post to which he has been called. It is a great and important assignment, but no little amount of that importance and greatness comes from the manner in which Admiral Moffett conducted it.

No official honor or tribute can do justice to the man Moffett and his work, but we can think of no finer tribute at this time than a recall of the current award of the Collier Trophy and a special posthumous award to the father of naval aviation.

◆

Subsidy and the War Debts

IN an admirable series of stories reporting a regular passenger flight over the Pan-American Airways system, C. B. Allen of the New York *World Telegram* makes mention of a complaint of American business representatives in South America which we hasten to bring to the attention of our aeronautical industry.

Mr. Allen found these American business men stationed at South American east coast ports asking with considerable bitterness (and much truth) why our foreign air lines in this sphere should be continuously subjected to unfair competition from European air lines. The European lines were completely subsidized. And how were they subsidized? By lavish funds from the French and German governments, which complain, more or less diplomatically, that they are without funds to pay their recognized debts to the United States. Americans may be gullible and long-suffering, and international good will is a good thing, but if France and Germany are so poverty-stricken that they cannot pay their just debts, the time has come for someone to ask why they can spend money so lavishly in a concerted and subversive effort to wreck our South American air lines. It's an old European trick of killing two American birds with one stone.

◆

Motion Picture Crash Thrills

REPORTING on the motion picture, Central Airport in *New Outlook* for May, Cy Caldwell says: "About what you'd expect when dear romantic Hollywood turns its camera on the more daring side of the flying game, with its real quota of stunts, wrecked aircraft, dead or damaged pilots, and love interest. It's a good box-office picture, and mildly entertaining if you haven't seen too many of the cinema's standard aerial disasters. The only wonder is that anyone in the aviation industry should connive with the movie people thus to malign the airlines and discourage and frighten anyone who might contemplate going somewhere by air. Here, for instance, we see an airliner, a tri-motored landplane, wrecked in the Caribbean Sea, with two drowned. The airlines do not fly land planes oversea. Furthermore, daring youths just out of school do not become factory test pilots and first pilots of airliners carrying passengers, as a young actor does in Central Airport. If audiences take this picture seriously, it will be a great boost for the railroads."

(Continued on page 60)

NOTES ON TAKE-OFF CALCULATIONS

PART I

Dr. Michael Watter

THE present article is a condensed summary of certain data and methods which the author collected and used from time to time in connection with various take-off problems. Besides the usual limitations of a magazine article, the material available is not sufficiently complete to cover fully this interesting problem of airplane performance, but it is hoped that the reader acquainted with the subject will find some useful and recent information, while those for whom the subject is new will be aided in their study. A brief list of references and sources of information will be given at the conclusion of this article.

THE problem of take-off analysis has been treated in numerous papers and articles, and a number of simplified formulas are in existence for a ready determination of the time and length of a take-off run of an airplane. In the case of seaplanes, because of the uncertainty and variation in float resistance, no such formulas are available.

With the increase in horsepower of engines in general use and the universal adoption of metal propellers, however, the simplified formulas fall short of their usefulness because of being based on typical thrusts which were obtainable for entirely different engine-propeller combinations and speed ranges and there are only a few formulas of recent origin which give excellent results.* The take-off characteristics are naturally greatly dependent upon the thrusts produced by the propeller, and while it may be possible to obtain a fair approximation by the use of abbreviated formulas, in general it will be found that a more careful analysis of the propeller employed is required.

The fundamental problem of take-off can be expressed in a well known relation of mechanics:

$$f = m.dv/dt = m.a \quad \ldots\ldots\ldots\ldots \quad 1$$

where f is the force, dv/dt the rate of change of velocity, that is the acceleration.

The force in this case is the excess of thrust over resistance, or:

$$f = T\text{-}R \quad \ldots\ldots\ldots\ldots \quad 2$$

It is evident that in order to evaluate the time and length of take-off run the variations of T and R must be carefully calculated. While T, the thrust, for a given propeller-engine combination and performance requirements, is a function of speed only, the resistance in addition varies with the change in the attitude of the airplane. This change does not affect greatly the take-off characteristics of landplanes, but in the case of seaplanes and heavily laden or relatively low-powered airplanes the resistance variation should be taken into consideration.

TABLE I

V/ Vg	Boats			Single Floats			Twin Floats		
	Δ%	Δ/R	K	Δ%	Δ/R	K	Δ%	Δ/R	K
0	100	–	–	100	–	–	100	–	–
20	96	10.4	10.6	96	8.1	8.4	96	8.1	8.4
25	94	7.4	7.9	94	6.5	6.9	94	6.6	7.1
30	91	6.2	6.8	91	5.1	5.6	91	5.3	5.8
35	88	5.3	6.0	88	4.3	4.9	88	4.5	5.2
40	84	4.9	5.8	84	4.1	4.9	84	4.1	4.9
45	80	4.8	6.0	80	4.1	5.1	80	4.1	5.1
50	75	5.1	6.8	75	4.3	5.7	75	4.3	5.7
55	70	5.3	8.3	70	4.7	6.7	70	4.7	6.7
60	64	5.5	8.6	64	5.1	8.0	64	5.2	8.1
65	58	5.5	9.5	58	5.6	9.6	58	5.4	9.5
70	51	5.3	10.5	51	5.8	11.4	51	5.5	10.8
75	44	5.0	12.5	44	5.6	12.7	44	5.3	12.3
80	36	4.5	12.5	36	5.0	13.9	36	4.7	13.1
85	28	3.9	13.9	28	4.1	14.6	28	3.9	13.0
90	19	3.1	16.3	19	3.2	16.8	19	3.1	16.3
95	10	1.8	18.0	10	2.0	20	10	2.3	23
100	0	0	–	0	0	–	0	0	–

The seaplane take-off analysis is complicated further by the presence of the "wake mass," which affects the effective mass to be accelerated and necessitates the introduction of an empirical coefficient.

General Procedure

It is assumed that the characteristics of the airplane, propeller, engine, float or type of the runway are known. The airplane characteristics consist of the gross flying weight and lift and drag at various angles of attack. The propeller characteristics are the diameter and thrust and torque coefficient curves against V/ND.

The extensive use of metal propellers and numerous tests conducted in the N. A. C. A. propeller research laboratory made it advisable and possible for the author to condense the information given in the N. A. C. A. Technical Report 350 in a series of generalized formulas. The chapter on simplified propeller formulas is a part of this article.

The engine characteristics consist of brake horsepower curve plotted against revolutions per minute. The characteristics of the float or hull are normally given in the United States in the form of displacement and ratio of displacement to resistance curves plotted against percentage of getaway speed.

The characteristics of the runway are simply the value of the coefficient of rolling resistance.

The general procedure of analysis is to plot the curve of attitudes of the airplane against speed in order to evaluate the aerodynamic and hydrodynamic lifts and air resistance.

Knowing the total lift, the weight borne by the landing

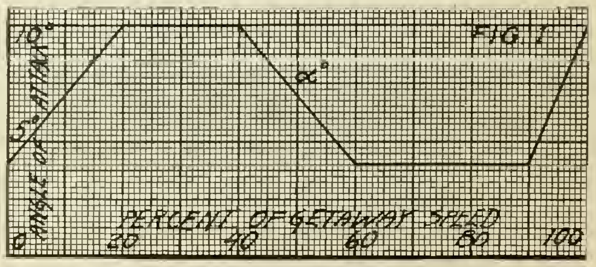


FIG. I

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*See NACA. TR. No. 450 by Walter S. Diebl.

gear is then calculated in order to find the rolling resistance for a landplane or the water resistance for a seaplane. Combining the air and ground resistance, we thus obtain the total resistance to motion. Having the thrust curve and total resistance, we next find the excess thrusts available for acceleration. By means of equation 1 for small intervals of speed we calculate and plot the curve of accelerations versus speeds. From then on we may either use graphical methods or step-by-step integration and differentiation in order to determine the time and distance of take-off run.

We shall now take up separately the problem of seaplanes and landplanes.

Seaplanes

Seaplane Resistance without Wind

For simplicity of expression, the author refers to airplanes capable of taking off from and alighting upon water as seaplanes. Following more definite nomenclature, one must distinguish between two distinct types: seaplanes where the float or floats serve the purpose of landing gear only and flying boats where the hull is used as a means of flotation and housing a crew or/and passengers, useful load, equipment, etc. Seaplanes are further subdivided into single- and twin-float types. The sponson, three-float and other modifications, because of their limited use in the United States, will not be dealt with here.

It is beyond the scope of this article to go into the subject of model basin tests, but a few observations may not be amiss. It is customary to test the model at various constant speeds under two sets of conditions—free-to-trim and at a fixed trim for a few settings. The free-to-trim condition is intended to represent the period of take-off up to 30 to 40 per cent of the get-away speed when the action of air controls is insufficient to counteract the effect of hydrodynamic moments. During this period the attitude of the plane is a function of these moments, relative setting of the float to the rest of the airplane, of the thrust line setting, thrust line position, etc.

The fixed trim runs are made with a view toward obtaining the resistance at such speed when the pilot is capable of controlling the attitude of the craft by means of the air controls.

While it is claimed that the assumption of a constant wing lift coefficient and the fact that speed during each run is kept constant do not lead to an appreciable error, yet it has been long felt by the author that a series of tests should be made using a new procedure with the aim of approximating more closely the actual take-off conditions.

Realizing the practical difficulties which would have to be overcome were one to attempt to duplicate the actual take-off conditions, it is proposed to establish from tests either a single or possibly three typical attitude curves. These curves are to be obtained from a number of tests of various seaplanes and flying boats along the lines followed by the N. A. C. A. in the tests the results of which are presented in T.R. 209, 226 and 242. The model tests then should be run from a standstill to the getaway speed, following possibly a linear speed variation and approximating the actual variation in lift due to wings. In the absence of such a test, if one desires to use the method of attitude curves, the procedure is as follows: From experience or observation, it is necessary to assume an attitude curve. A suggested variation is given in Figure 1, but in view of the limited material available to justify it, this diagram should be considered merely as a reference.

Knowing the attitude and the speed, it is possible to evaluate the lift of the wings and by extrapolating the results of the basin test to obtain the hydro-dynamic lifts and resistances. The air resistance is calculated, neglecting the fact that part of the flotation system is submerged. In extrapolating the model tests it is necessary to resort to Froude's Law of Comparison. Diehl's "Engineering Aerodynamics" gives a brief explanation of this law and the following extract will be found useful.

Let V_1 = model speed, V = full scale speed, R_1 = model resistance, R = full scale resistance and L = linear ratio of full size to model. The corresponding speeds follow the law of $V = V_1 \sqrt{L}$, while the resistances of corresponding speeds, $R = R_1 L^3$. Since this displacement is also a function of the cube of the scale ratio, it is evident that at corresponding speeds the ratio of displacement to resistance is the same for both model and full scale. The standard method of seaplane resistance-calculation, as stated above, is based on the use of displacement and displacement-to-resistance curves plotted against percentage of getaway speed which is taken as a speed about ten per cent higher than the stalling speed of the airplane.

Table 1 and Figure 2 are based on the charts taken from H. C. Richardson's "Naval Development of Floats for

(*Continued on page* 62)

TABLE 2

V	ΔV	Aav	Δt	t
0	ΔV_1	a_1	Δt_1	0
V_1	ΔV_2	a_2	Δt_2	Δt_1
V_2	ΔV_3	a_3	Δt_3	$\Delta t_1+\Delta t_2$
V_n	ΔV_n	a_n	Δt_n	$t_n=\Sigma\Delta t$

TABLE 3

t	Δt	Vav	ΔS	S
0	Δt_1	V_1	ΔS_1	0
t_1	Δt_2	V_2	ΔS_2	ΔS_1
t_2	Δt_3	V_3	ΔS_3	$\Delta S_1+\Delta S_2$
t_n	Δt_n	V_n	ΔS_n	$S_n=\Sigma\Delta S$

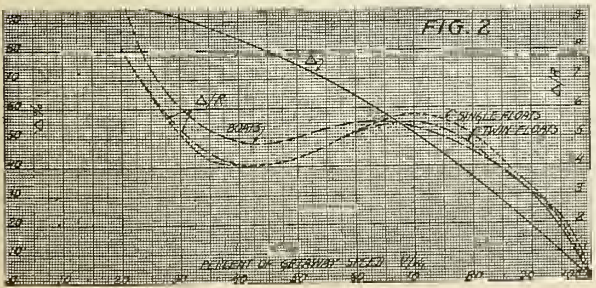
FIG. 2

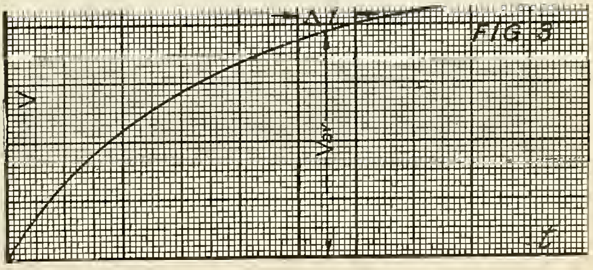
FIG 3

Personairlities

By Caldwell

I DON'T KNOW why it is, but all these glider enthusiasts seem peculiar, somehow or other. I can't figure out whether they got peculiar through being with gliders, or whether they went with gliders because they were peculiar anyhow, in which case their being with gliders didn't matter. Gliders themselves are sound enough, and there's no reason at all why a man who runs a glider should be any queerer than one who runs an airplane, or even an elevator. But he usually is. There probably are normal people gliding. Only, I haven't met them.

W. F. Barnwell

Take this chap Woodward F. Barnwell, for instance. Or don't take him—I don't care. He's down there in Jacksonville, Fla., Chairman of the Organization Committee of the Florida Glider Association. He glides, and between hops he takes grapefruit skins and turns them into candied fruit peel. He has built up a business in this product and amuses himself by putting pieces of the candy in his letters so the pages all stick together and you can't read them. Which I often think would be a good idea for correspondents generally.

Now, when I asked Mr. Barnwell for his biography, he wrote it all down, got some grapefruit and stuck it together, and mailed it to me. To show you what gliders have done to him, I print it just as received. He seems to have a new sort of language, which comes either from gliding or tarpon fishing:

"I am born in Jacksonville, Fla., during a snowstorm a couple of days before Christmas in 1892; and everyone should know this is a very exclusive time to be born in Jacksonville because it hasn't snowed there on this day from Ponce de Leon's time until I am born.

"My brother is more than somewhat older than I am, and he spends some eight years in college getting several degrees in English so he can be a professor. And after all this devotion to language he becomes instructor of machine shop practice in Throop Institute which is in Pasadena, Cal. Which goes to show what a wonderful educational system we have. I am not doing so well in high school about this time, which is around 1910, so my brother invites me to California, where I spend three years and learn more than a little about machinery.

"I have a buddy there in this machine shop work named Oscar Swanson when we are 20 years old, and we build from my plans the first all-metal monocoque fuselage ever constructed. This is in 1912-13, and it is all complete with 2,400 and some odd rivets, but no wings, so we don't fly it. But another buddy of mine who goes by the name of Walter Corwin likes my idea of all-metal fuselage construction. He builds one along similar lines, only with wings, and a four in line water cooled two-cycle motor of his own design and construction. This Corwin monoplane is a hot looking craft and is tried out by a fellow whose name escapes me now. He is athletic coach in the Pasadena high school at this time I am talking about, and claims to be an aviator. But all he ever does with the Corwin craft is nose it over.

"I am working in the old Glenn L. Martin airplane factory in Los Angeles at this time, helping make the first five place hydro-aeroplane, and rushing things so Martin can have it ready for the 1913 race around Lake Michigan. I have Sundays off, so I go to watch Mr. Coach fly the Corwin job, but all I see is much dust and a few broken props. Mr. Martin's plant manager finally gets all the rush work out of the way and dispenses with my services, which startles me more than somewhat. Corwin likewise lets Mr. Coach out of his flying job, which startled nobody, and gives it to me on condition that I carve out as many props as I break." (This is probably the most unique condition under which a test pilot who couldn't fly was ever hired.) "So I rig up one of those prop protecting nose skids like the French are using at this time (1913) and cut grass for a week in the old Tournament of Roses Field in Pasadena. This monoplane lifts itself clear of the ground at least once while I am riding it, but those two-cycle horses out front don't seem spirited enough to take me over the trees at the end of the field, so I don't fly this day.

"We figure this craft will do well at sea level, so we arrange to try it out at Long Beach. We strap the wings to the fuselage and are towing it tail first behind a Regal underslung. A truck backs out of an alley, the Regal stops, the tail group crashes into it, the fuselage buckles forward of the stabilizer, and the flying days of the Corwin monoplane are ended. I'm in no aircraft from then until 1929, but meantime I am studying about it."

After sixteen years of study Mr. Barnwell flies gliders. I don't know what that proves, but it must prove something. Here's a man sits thinking of aviation from 1913 until 1929, and then learns to fly gliders and glue letters together with grapefruit. Mr. Barnwell had a Cadet Primary, built by Baker McMillen Co., which by last year was worn out in service only through rust in the tubing, due to the salt air of the beach where training was done. This glider made over 6,500 safe flights in some two years with more than 100 students off the ground, and less than $10 in crash damage in all that time. He has a careful and evidently successful course of instruction in gliding and has given many their first start in aviation. If they'll only stick to aviation and work hard, I wouldn't be surprised if they, too, ended up with candied grapefruit.

* * *

AMONG THE IMPORTS from Italy that have made life more agreeable in America are olives, olive oil, spaghetti, macaroni, anchovies and Giuseppe Mario Bellanca, pilot, airplane designer and builder, and outstanding American citizen. He was born in 1886 in a small Sicilian town named Sciacca—not to be confused with Sciatica.

That old archeologist, Leon Kelley, has been making biographical excavations in Sicily and has found that Giuseppe Bellanca became an airplane designer because he was born near a pottery. Piles of discarded and broken plates surrounded this pottery, and the youthful Giuseppe amused himself by hurling these fragments not only into the air but at chance passers-by. In this pastime he learned that air has density, though not a density comparable to that of human heads. Plates would rise on the dense air, curving upward after the manner of a stock market graph of 1928, and then descending in a 1931 graph. It was all very fascinating, proving again that what went up would come down, and crash.

With other lads of Sciacca, young Bellanca used to fly kites. The sea winds rushing up the slopes on which this pleasant Sicilian town was situated lifted the kites high in the air, raising some of them to altitudes attained only by vice presidents of aviation enterprises in the Great Upheaval of four years ago.

He graduated from the Royal Institute in Milan, Italy, where he learned the facts behind the physics that he had been studying at first hand in the pottery and the kite-flying fields. He applied his knowledge of fluid forces in the design of marine propellers, excellent training for a man who was going to deal in curves all his life. Either in aerodynamic fields or in producing musical shows on Broadway, a knowledge of curves is essential.

While working in Milan, Mr. Bellanca had read of the Wright brothers' success. They also had experimented with kites. But it was not until 1908, when Leon Delagrange made his record-breaking flight in France that Bellanca, then 22, procured from a wealthy friend the funds to build a plane. It was not designed in accordance with his own ideas. Bellanca wanted to build a tractor, in which the propeller could whirl in air as undisturbed as a Senator's dreams. The backer liked pushers, so a pusher it was. On the first flight, the daring Bellanca, who couldn't fly, pushed it into the ground. This pushed the wealthy friend out of aviation and so shocked the Bellanca family that in 1911 they all emigrated to Brooklyn.

Giuseppe had designed and built a tractor biplane in 1909, before the family left Italy. In simplicity, shape, elementary streamlining and constructional features it was quite prophetic of today's aircraft. And it flew, which was no mean feat in those days. But capital was lacking to advance it. So further aeronautical experiments were deferred until the family arrived in Brooklyn, when Giuseppe designed a little parasol monoplane. His father and brothers helped on the metal and woodwork; his mother and his sister helped by stitching the fabric.

There were dire prophecies of failure when Bellanca assembled his little plane on what is now Roosevelt Field, Long Island. In this plane Bellanca made himself into a pilot and, opening a one-man school, taught many others. In several features of his design he was far ahead of his contemporaries; he had a tractor monoplane with a radial air-cooled engine, the open-faced forerunner of the monoplane type of cabin planes which he was to build with such success later on.

When the United States took over the flying fields, Bellanca went to Hagerstown, Md., where in 1916 he designed and built two tractor cabin biplanes for the Maryland Pressed Steel Co. In 1921 he built a cabin monoplane, designed primarily for efficiency. It was in this Bellanca, powered with a faltering Anzani engine, of about 90 h.p. or less, that Col. Harold Hartney had the temerity to race against such ancient whales of speed as Casey Jones, Jim Ray, Walter Beech and myself at the Dayton races, October, 1924. We beat him in speed, but he beat us all in the efficiency contest, proving the notable efficiency of Bellanca's design. It is a noteworthy fact that this same general type of Bellanca plane, with practically no fundamental changes, but of course with many improvements of design, has won every efficiency contest in which it has been entered in the National Air Races since 1923.

It was Mr. Bellanca's conviction that due to the reliability, simplicity and light weight of the radial engine it was destined to play a large part in the advancement of commercial aviation. For the Wright Aeronautical Corp. he built a development of his cabin monoplane that made aviation history; it was named the *Columbia.* After observing its performance, a young air mail pilot named Lindbergh attempted to acquire it for a trans-Atlantic flight. But the Wright company was reluctant to sell it for such a perilous adventure. Meanwhile, as Lindbergh was preparing for the flight in the *Spirit of St. Louis,* a pilot then unknown to fame was flying endurance tests in the *Columbia.* His name was and still is Clarence Chamberlin, one of the finest gentlemen who ever flew an airplane to Germany or anywhere else. With Bert Acosta he broke the world's endurance record in 1927 in the *Columbia* and was given his chance to compete with Lindbergh in the trans-Atlantic venture. Then, as every school boy knows, Lindbergh made his picturesque flight that aroused the admiration and stimulated the imagination of the world. Soon he was followed by Clarence Chamberlin in the *Columbia,* carrying a greater fuel load, Charles Levine and two ham sandwiches, and breaking Lindbergh's record for distance by flying 3,911 miles to Germany.

This flight and Yancey's and William's flight to Rome brought G. M. Bellanca fame, but he accepted it with his habitual calmness and remarked, "The flight has not added anything of moment to the science of aviation." Which was perfectly correct, but that and Lindbergh's flight aroused an interest in aviation that resulted in millions of dollars being poured into aviation. More honors were added to the Bellanca reputation in 1931, with the record long-distance flight of Boardman and Polando to Istanbul in the Bellanca *Cape Cod* and the first non-stop trans-Pacific flight by Herndon and Pangborn in the Bellanca *Miss Veedol,* as part of a 'round-the-world air trip.

The du Pont family, feudal lords of Delaware, whose sound and capable Henry du Pont had long been interested in flying, decided to enter aviation. Everyone who ever had seen or touched an airplane rushed to Wilmington to gain the favor of the powerful du Ponts, who could take a bale of cotton, put it through their factories, and turn it into an explosive sufficiently powerful to lift the National Aeronautic Association out of its rut, if it had ever been tried on that worthy body. But the du Ponts knew the man they wanted—G. M. Bellanca, so they went after him and dug him out of the old shipyard on Staten Island where he was happily building more Bellancas. Their intention was to wrap him securely in cellophane and transport him to Delaware well under control. But Mr. Bellanca refused to be wrapped. When he got down there it was with fifty-one per cent of the stock in the new company, which gave him full control. This was a greater feat than has been performed in aviation before or since.

G. M. Bellanca

However, although great minds are said to think alike, great financial interests and great airplane designers seldom run on parallel tracks, so it was not long before their paths diverged. The du Ponts returned to their amusing task of wrapping cigarettes in bombproof cellophane packages, and Mr. Bellanca interested other bankers in the aviation business, still retaining control himself, which had become practically a habit with him.

His various planes are well known to you six readers, so I'll do no more than mention the Pacemaker, the Skyrocket, and the Airbus, which embody Mr. Bellanca's ideas of the desirable proportions in which to mix speed, lifting capacity, safety and cost of operation in order to turn out a fine useful airplane. I visited him in his factory at Newcastle, Dela., this winter, and found him the same philosophical, humorous, kindly fellow that he was back in the days before fame had touched him. He hadn't changed since the days when I had discovered him whittling out wings of his own design to improve the performance of the Air Mail's D.H.'s, which were finally completed and did improve the performance. In a world where much has come adrift in the last few years, it is cheering to find a man still going about his affairs with confidence and a firm command of philosophy.

PRIVATE FLYING

Club Organized at Brockton, Mass.

A GROUP of girls interested in flying have formed a club at Brockton, Mass. Ground school subjects are being studied, and meetings, open to all women pilots, are held at the Brockton airport. Officers of the group include the following: President, Helen Edwards; vice president and treasurer, Eunice Faunce; secretary, Phyllis Reynolds.

Ninety-Nines Form Cleveland Group

MRS. M. T. DAVIS was elected president of the Cleveland, Ohio, chapter of the Ninety-Nines, national women's aeronautical group, at a recent organization meeting. Among other officers are the following: Vice president, Abbie Dill; secretary-treasurer, Lauretta M. Schimmoler; assistant secretary-treasurer, Ann Barille.

Betsy Ross Finance Officer Named

MRS. DOROTHY PRESSLER, Oklahoma City's only woman transport pilot, recently received membership in the Betsy Ross Air Corps and has been appointed its national finance officer.

Air Cruise to Yacht Races Planned

THAT the Interlake Yachting Association air cruise will be held again this year has been assured by Commodore C. O. Miniger of Toledo, Ohio, who heads the yachting organization. The cruise is a one-day affair held in conjunction with the yacht races at Put-In-Bay, in Lake Erie. J. Nettleton has been asked to head the aviation committee. The date for the cruise will probably be early in July.

Amherst College Group Formed

THE AMHERST COLLEGE FLYING CLUB has been formed at Amherst, Mass., with about fifteen or twenty students showing interest. Don Hood, an Amherst alumnus and operator of Lafleur Airport and Flying Service at Northampton, Mass., is director of the new organization.

E. C. Twitchell has been elected temporary president, and W. D. Strohmeier is secretary. Gliding and flight instruction is planned to take a place in the club's activities.

Rhode Island Flying Club Organized

THE HILLSGROVE FLYING CLUB has been formed at the Rhode Island State Airport, Hillsgrove, R. I., and incorporated under the laws of the state. A Travel Air Sport Trainer, powered with a Wright Gipsy engine, has been purchased, and operations have been commenced, with Charles Cowan as instructor.

The officers of the club are: President, Arthur Schwab; vice president, James Fletcher, and secretary and treasurer, Henry Stone. Seven of the members have their private licenses. The club ship is being stored at the E. W. Wiggins Airways hangar.

College Park Sportsmen Pilots' Meet

AMATEUR PILOTS throughout the East are expected to participate in the Langley Day air meet at College Park Airport, Md., May 7, under the auspices of the Washington Air Derby Committee in co-operation with the Greater National Capital Committee. A dance in honor of the contestants will be given on the evening of May 6 at Washington, D. C.

About twenty trophies and prizes are scheduled to be awarded to winners of the various competitions. Among these contests will be a slow race, for planes of 85 horsepower or less, dead-stick landing and bomb-dropping events, a women's race, an acrobatic contest and other races. A model plane contest also will be held for flying and scale models.

George Haldeman will be referee, and Maj. E. W. Tipton, starter. Judges will include Eugene Vidal, Paul Collins, A. K. Barta, George O. Vass, A. C. Case and Major General James E. Fechet.

Washington, D. C., Club Building Plane

THE KENILWORTH AIRCRAFT CLUB of Washington, D. C., is constructing an airplane in which to start flying training this summer. The organization, which will be one year old this month, is headed by George Sanders. Other officers include Carl Wilhelm, Claude Brown, Kenneth Buker, Norman Cissel, Howard Rupard and David Maize.

Junior members participate in model activities, and older members have organized a "Prop and Wing Degree," to which are confined the flying activities of the organization. Willard A. Driggers, Mr. Cissel and Mr. Rupard head this section.

Birmingham Club Officers Chosen

J. MOOSE was elected president of the Birmingham (Ala.) Aero Club at a recent meeting, succeeding Steadham Acker. Harold Wood and Capt. L. W. Meadows were chosen vice presidents, while Lovick Stephenson, Jr., was elected secretary-treasurer. The board of governors includes M. Lawson, W. A. Steadman, Leander Poole, R. Bauman, Sumpter Smith, Asa Rountree, Jr., E. B. Eady, Hayden Brooks, L. E. Geohegan, John Donalson, Joe Brady, George Connors and Mr. Acker.

Baltimore Club Chooses Officers

ROBERT B. HALL was re-elected president of the Chesapeake Flying Club, Inc., of Baltimore, Md., at the annual election of the organization recently. Mr. Hall was one of the organizers of the club and has held the office of president since the organization's formation in 1928. Other officers chosen were Stanley Blugis, Clarence Fisher, Gail King, Stanley Bouis and Gwyn Lease.

The club was organized for the purpose of aiding aviation enthusiasts to learn how to fly at a moderate cost. The membership contributed originally to the rental of airplanes and for privileges of using local flying fields. The support of the membership has made it possible to purchase planes, and the members own their share of the equipment. The membership of the club has, since its organization, flown more than 2,000 hours without injury.

National Charity Air Pageant Planned

ANNOUNCEMENT of a National Charity Air Pageant, to be held under the auspices of the U. S. Amateur Air Pilots Association at Roosevelt Field, L. I., N. Y., October 7-8, was made last month by John S. Reaves, president of the association. The event will be arranged with the cooperation of the Judson Health Center. These agencies are taking over the sale of tickets and will participate largely in the profits of the pageant. Combined headquarters have been established at the Waldorf-Astoria hotel, from which the ticket-selling campaign will be directed. Mrs. Franklin D. Roosevelt has accepted the honorary chairmanship of the pageant as an honorary member of the pilots' association.

The pageant will be preceded by sectional meets held at Atlanta, Ga.; Springfield, Mass., and Indianapolis, Ind. The first two are scheduled for June and the latter for September. The regional meets will be conducted under the direction of the state governors of the Amateur Air Pilots' Association. John H. Candler, Georgia governor, will be in charge of the Atlanta meet, and Edmund F. Ball, Muncie, Ind., the one at Indianapolis. John W. Lasell, of Whitinsville, and James P. Whittall, of Worcester, Mass., are to direct the Springfield affair. Local charities will be designated as the beneficiaries of the regional shows. The sectional champions, picked from among the contestants in the regional meets, will compete for honors at the pageant.

The program of both the regional and national event is being patterned after Great Britain's Spring Festival. Pageants to provide a setting for the aviation programs of both the national and sectional meets will be arranged.

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• AT THE AIRPORTS •

Salt Lake City Building to be Opened

CONSTRUCTION WORK on the new municipal airport administration building at Salt Lake City, Utah, has been completed. A public reception and formal opening of the building will take place May 14. The structure cost $40,000 and provides general offices, office suites for air transportation lines, post office, weather and radio bureaus and a small emergency hospital and fire station. Four rooms in the new building have been leased to the Federal Government, which has an option on monthly renewals until after June, 1940.

Rhode Island Airport Being Improved

WORK on grading land and grounds about the administration building at the Rhode Island State Airport at Hillsgrove was begun last month by a group of the state's unemployed, while another unit worked at cutting down a patch of trees adjoining one of the airport's boundaries, which constitutes a hazard to flying. Installation of a drainage system at the field is to be started soon.

Air Meet at Chattanooga, Tenn.

AN AIR SHOW and field meet was to be held in Chattanooga, Tenn., on April 30 by the Chattanooga Pilots' Association at Lovell's Field. A number of racing events, open only to Chattanooga pilots, were to be held.

Texas City Prepares for Field Opening

THE CITY of Palestine, Tex., purchased an all-steel hangar, capable of housing sixteen ships, from Wings, Inc., of Shreveport, La., for the municipal airport. A formal airport opening is planned and scheduled to take place in June.

Castile, N. Y., to Have Airport

FIFTY-EIGHT ACRES have been leased at Castile, N. Y., by American Airways, Inc. The leases cover a ten-year period, and the land will be converted into a landing field on the route from New York to Chicago. Work is to be begun soon on the project, and airway officials said they hope to complete it by June 1. One reason for the landing field is an increasing demand for air transportation to and from nearby Letchworth Park.

Southern Airport Building Planned

IT IS EXPECTED that the hangar and airport office building of the southern division of American Airways at Meacham Field, Fort Worth, Tex., will be ready for occupancy by the company June 1. The building was designed by the firm of A. Epstein, structural engineers, of Chicago.

Simplicity is the keynote of the hangar design, the architecture being of modernistic type. Total cost of the new structure and equipment will be in excess of $150,000. The exterior of the hangar is black and white. Special attention has been given to the lighting of the building, with factory-type panes used throughout to afford a maximum of outdoor light. After dusk floodlights on the roof will light the building and the grounds around it.

The hangar will be 135 by 200 feet, with an office building 25 by 142 feet, facing the field. This building will be two stories in height and contain pilots' room, operations room, radio room and other operations offices on the main level with offices for executives on the second floor. The office of C. R. Smith, vice president of American Airways in charge of the southern division, will be located in this building.

A full 123-foot span is provided at each end of the hangar, with doors giving a clearance of 23 feet. Special electrical connections located in the floor of the hangar will make it possible for lights to be brought to planes at any position on the floor, eliminating the necessity of trailing wires. The lighting equipment will be the most modern available. The space above the doors on either end of the hangar will be finished in asbestos-protected aluminum finish, which will give the hangar signs the effect of being mounted on aluminum without glare of light reflection. Signs on the roof, for the benefit of aviators, as well as signs on the sides of the hangar have been planned.

Radio Station Established at Houston

A RADIO RANGE FINDING STATION will begin operation immediately at the Houston (Tex.) Airport, by authority of the Aeronautical Branch of the Department of Commerce, according to S. C. Mashburn, director of the stations.

Boise Airport Building Completed

BROADCASTS of weather information on the Salt Lake City-Pacific Northwest airway of United Air Lines from Boise, Ida., will now be sent from transmitting equipment located in the newly completed communications building at the Boise airport. The airport has been improved, with a large crew of city employees at work on the field.

Changes at Oakland, Calif., Airport

F. G. McELWAIN has been named assistant superintendent of Oakland (Calif.) Municipal Airport.

Traffic signals are now in operation at the field with the completion of the installation of the new type wind direction indicator on top of the airport inn.

Roosevelt Field Museum Opens

THE ROOSEVELT FIELD Historical Aviation Museum at Mineola, L. I., N. Y., was opened to the public April 16. For about a year the management, under the direction of K. S. Lindsay, has been searching for interesting specimens of aircraft pioneering and progress.

One of the largest hangars at the field, Building 23, houses the display. The airplane exhibit includes eleven authentic, original ships and covers the period from the "pusher" type biplane and the Bleriot monoplane through the training and fighting ships of the World War period to the first successful monoplane cabin type which heralds modern practice in design. The wartime planes are restored to their original condition and appearance, including camouflage and machine guns, and the fabric is cut away on one dual-control ship, revealing the control stick, instruments and equipment of early flying. A number of the exhibits were flown from the field years ago and were well known to pioneer fliers.

A large collection of aircraft engines of modern and old historical types is housed in the museum. Among these is a two-cycle engine which was used by pioneer fliers, and the exhibits include models from France, Germany and England as well as American types.

Oklahoma Repair Shop Licensed

FULL LICENSE has been issued the aircraft shop recently established by John Burke and associates with the Oklahoma Aviation Service, Inc., according to information received by Burke recently from the Department of Commerce. The shop is now equipped to handle every kind of work on aircraft or engines, including aluminum tubing.

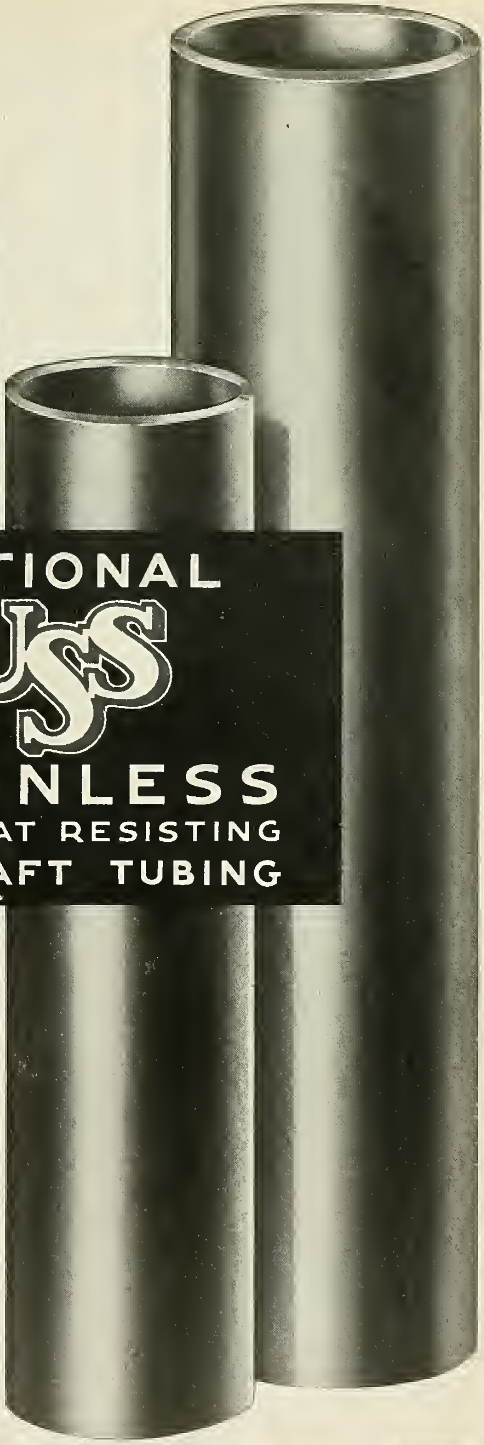
Airport Increases Storage Capacity

SOMERTON AIRPORT, Philadelphia, Pa., operated by the Flying Dutchman Air Service, will augment its equipment with the erection of a large steel hangar. This hangar, which is to be completed by May 1, will increase the airport's capacity from twenty to fifty planes. The airport now has airplane storage space totaling 18,000 square feet, with 2,000 square feet additional of shop space.

The airport contains 115 acres of well drained sodded ground with good approaches. It is managed by Ernest H. Buehl, who has had over nineteen years of aviation experience. Among services carried on at the airport are complete sales and service, flying instruction and storage. A fully equipped engine repair station is operated by Jerry Kelsey, with

(Continued on following page)

Aircraft Tubing at its best!



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AIRCRAFT TUBING

For many uses in aircraft construction, NATIONAL U S S 18-8 Stainless and Heat Resisting Aircraft Tubing introduces new measures of economy and of safety. High resistance to corrosion and to injurious effects of temperature are combined with great strength and unusual uniformity. This chromium-nickel alloy seamless tubing conforms fully to U. S. Army and U. S. Navy specifications and is made from the finest quality electric-furnace steel. NATIONAL engineers will gladly lend their aid in determining the best application of NATIONAL U S S 18-8 Stainless and Heat Resisting Aircraft Tubing to particular requirements. Descriptive literature will be supplied on request.

[U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York, and Fried. Krupp A. G. of Germany.]

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Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif. *Export Distributors*—United States Steel Products Company, 30 Church Street, New York, N. Y.

(*Continued from preceding page*)

over twelve years of airplane engine experience. Aviation Salvage Co. deals in engines and accessories, with John L. Baker, a former Navy pilot, in charge.

John Rogers, licensed aircraft mechanic and former superintendent of Ludington Flying Service repair station, will be in charge of the aircraft repairs and ground instruction to be known as the Flying Dutchman Repair Service. A quantity of material and supplies has been purchased by Rogers to establish an airplane supply house.

Repair Shop Opened at Tacoma

BERTRAM RUOFF has installed an airplane repair shop at Pierce County (Tacoma), Wash., Airport. He has leased quarters for the purpose in a hangar. Mr. Ruoff is a licensed transport pilot and also a licensed airplane and engine mechanic.

Laredo, Texas, Acquires New Field

A NEW AIRPORT will be opened soon by the city of Laredo, Tex. An exchange of tracts of land that will give this border city an airport of about 380 acres adjoining Casa Blanca Country Club in place of the old municipal airport, three miles north of town, has been made. A standard-size hangar is on this field, and runways have been built.

Clubs Plan Municipal Field

THE ROTARY and Lions clubs of Greenville, Tex., have made plans to provide a modern airport for that city. The new airport will be located one mile southeast of Greenville and will be known as the Municipal Airport. Plans for the field have been completed, and progress is being made toward construction. Work includes lighting of the field of sixty acres and a 2000-foot runway.

Utica, N. Y., Field Improved

THE LANDING FIELD at Utica (N. Y.) Municipal Airport has been extended by 2,800 feet as a result of the cutting down of trees in two woods. The entire woods at the eastern end of the field is being cleared away, and many trees on the Marcy State Hospital property have been felled. A clear approach to the field from the east and west is now available, according to Reginald I. Heath, superintendent of the airport.

Oklahoma City Ticket Office Changes

OPERATIONS of the Consolidated Airlines ticket office at the Oklahoma City Municipal Air Terminal, following resignation of H. C. Duncan, manager, have been turned over to C. D. Sawyer, new manager and formerly assistant in the office, and Leon May, new assistant, formerly of the Biltmore Hotel, Oklahoma City, transportation department. Mr. Duncan resigned recently to become traffic agent of the United Air Lines at Tulsa, Okla., succeeding R. Green, who resigned. The Air Terminal office is maintained by all airlines operating through Oklahoma City upon a cooperative basis.

New Wyoming Airport Planned

EVANSTON, WYO., to have an adequate airport, according to a decision arrived at recently following the visit of H. T. Lewis, chief pilot and field operator of the Boeing Air Transport. A site is being cleared west of the city which is reported to equal the ones at Rock Springs and Cheyenne. It is planned that the city will buy or lease the land and that the Boeing company will maintain the field.

Hangar to Be Named in Moffett's Honor

THE FIRST HANGAR to be completed at the Shushan Airport, now under construction at New Orleans, La., will be named in memory of the late Rear Admiral William A. Moffett, according to O. L. Shushan, president of the New Orleans Levee Board.

Free Storage for Transients' Planes

FREE OVERNIGHT STORAGE is offered transients at the Curtiss-Bettis Airport, Pittsburgh, Pa., according to a recent announcement. The airport, located 7½ miles southeast of the Pittsburgh business district, is managed by W. C. McConnell, Jr.

Primitive Area Fields' Use Forbidden

EXCEPT for official business or in case of emergencies, no airplanes may use Forest Service landing fields within the South Fork or any other Primitive Area in the Northern Rocky Mountain Region, according to Evan W. Kelley, regional forester at Missoula, Mont.

This policy is adopted, Major Kelley explained, in order to preserve the integrity of Primitive Areas and to prevent unnecessary elimination or impairment of unique natural values. The policy does not apply to back country outside of the Primitive Areas.

The Forest Service has constructed five emergency landing fields in the South Fork Primitive Area, using them for fire control and administrative purposes.

Santa Cruz Field Manager Named

ERROL VON TEMPSKY, flying in Southern California for the past two years, has returned to Santa Cruz, Calif., where he has been appointed field manager of the local airport. He also is associated with the Cope Flying Service, which operates from the field.

Pittsburgh Used Airplane Display

PITTSBURGH'S first used airplane show will be held May 19-21 at Curtiss-Bettis Airport. All the airplane owners in the tri-state district of Western Pennsylvania, Ohio and West Virginia who desire to offer airplanes for sale have been invited to display them at this show.

Company Takes Control at Teterboro

THE AIRPORT at Teterboro, N. J., formerly operated under several flying companies, has been taken over by the Teterboro Airport Corp. Capt. A. G. Norwood, aeronautical teacher and pilot, is operations manager.

Improvements to be made at the field include the laying of asphalt strips and the equipment of school and pilot rooms with lockers and showers. A repair shop also is to be established.

Lighting for Galveston Airport

THE CITY of Galveston, Tex., has awarded the Home Electric Shop of Galveston the contract for supplying 10,000 feet of cable to serve border lights at the municipal airport. This is the first step in the lighting program embarked upon by the city. Floodlights and other equipment will be installed later.

Louisville Airport Enlarged

TWENTY-FIVE ACRES have been added to the landing area of Bowman Field, Louisville, Ky., through the employment of 500 men working in three-day shifts, under an unemployment relief measure. This portion of the airport, bringing the total area to 280 acres, will be ready for use in the fall.

Airport Named for Army Flier

THE CITY COMMISSION of Enid, Okla., has voted unanimously to change the name of the Enid air park to Woodring Field, in honor of the late Lieut. I. A. Woodring, Enid aviator.

Western Airport Established

THE YAKALA FLYING SERVICE, INC., has been organized by Basil Dhanens and Keith Goings at Vancouver, Wash. They have completed a new private flying field on the Pacific Highway.

Sales Firm Opens Office at Airport

HARDY YOUNG, of the aviation firm of Giblett and Young, Waco distributors, has announced opening of an office in the Oklahoma City Municipal Air Terminal building.

Birmingham Airport Shop Changes Hands

OPERATIONS of the repair shop at the Birmingham (Ala.) Municipal Airport are to be handled in the future by the City of Birmingham. The shop will be under the direction of Steadham Acker, manager of the field. The Birmingham Air Service formerly operated the shop.

Cleveland Airport Director Named

CLAUDE H. KING, assistant superintendent of Cleveland (Ohio) Airport, has been given immediate supervision of the port by E. E. Adams, who recently became acting superintendent of the flying field upon the retirement of Maj. John Berry. Mr. King will direct operations at the airport until a permanent superintendent is selected to succeed Major Berry.

The new 1933 WACO Model F-2 is the ideal ship for business or pleasure

That exciting moment when a man first takes the controls of the WACO Model F-2 into his own inexperienced hands! How quickly nervousness is replaced by confidence—and then by the thrill of a lifetime!

It's so amazingly easy!

The WACO Model F-2 is so smooth and steady in flight that it almost seems to fly itself. And it is as easy to "take-off" and as easy to land as it is to fly.

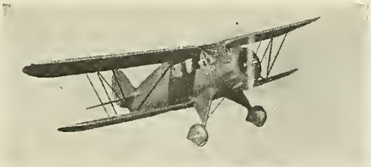
In actual tests the wheels of the WACO Model F-2 have left the ground after a run of less than 100 feet. And they can be made to stop within the same short distance when the ship is being "set down."

The 1933 WACO Model F-2 has been made as comfortable, air-worthy and practical as WACO engineers know how to make it. The front cockpit and the seat arrangement have been redesigned to provide uncrowded accommodations for the pilot and two passengers. Windshields are larger. There's a speed ring cowl as standard equipment—also an airspeed indicator—plenty of room for baggage. And design and construction throughout, of course, are typical of the thoroughness that WACO puts into every part of every ship.

The price, with Continental engine, 210 H.P., is $5,025. With Jacobs engine, 170 H.P., $4,415. Both prices flyaway Troy.

See for yourself how easy it is to fly a WACO. Learn to fly with our local dealer. If you do not know his name, write us.

THE WACO AIRCRAFT COMPANY
TROY, OHIO



The new 1933 WACO Model C four-place cabin plane is a craft of patrician beauty and a masterpiece of classic design. It combines the highest degree of comfort, refinement and performance.

The new 1933 WACO Model A two-place, side-by-side convertible, open or closed, plane offers twelve major improvements which make it one of the most convenient and most practical ships ever built.

DEALERS! The WACO franchise for 1933 offers dealers a real proposition. If interested, we suggest that you get in touch with us at once.

WACO LEADS IN AIRCRAFT REGISTRATIONS

WACO AIRPLANES

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• NEWS OF THE SCHOOLS •

Trade School Gives Mechanics Training

THE PRIVILEGE of accompanying licensed pilots in flights as part of the training program for students in the aircraft mechanics course at the State Trade School, Putnam, Conn., has been announced by H. H. Ellis, director of the school. The privilege is extended only to students who have compleed at least 2,500 hours of satisfactory work in the course and is subject to certain restrictions.

The school includes courses for both airplane mechanics and airplane engine mechanics. Airplanes and engines are repaired at the school for private owners and for such agencies as the State Department of Aeronautics. The school also owns two planes, which must be serviced and kept in condition. Shop training is therefore of a practical character and composes sixty per cent of the total time. The school holds a Department of Commerce approved repair station certificate for welded steel tube structure, excluding fittings; wood structure, excluding box and laminated spars; fabric covering, and assembly. An engine torque test stand was recently designed and made by the students and has been placed in use.

Boys desiring to enroll must be at least 16 years old and pass through a probationary period in machine shop work, drafting and mathematics.

Pittsburghers' Flying Course

A SPECIAL FLYING COURSE for residents of Pittsburgh has been announced by The Haller School of Soaring Flight, Inc., Pittsburgh, Pa. Week-end lessons in gliding and soaring are offered by the school at its Pittsburgh-Greensburg Airport at a low rate that includes training, board, lodging and transportation.

Other courses being given by the school include a two-week gliding course, a three- to five-week gliding instructor's course, a two-week soaring course for licensed glider pilots and a special motorless flying instructor's course. This last course, which is designed to be equivalent to a college semester, includes the training offered in the three other courses in addition to lectures on meteorology, soaring science, sailplane and glider design and construction and practical shop training in the Haller-Hirth Sailplane Corp. shops. Graduates of this course will receive a Department of Commerce commercial glider pilot's license, following the passing of required tests, and a motorless flying instructor's certificate issued by the school.

Engineer Joins Boeing Faculty

E. J. KRENZ will instruct in the subjects of communications, mechanics and engineering drawing at the Boeing School of Aeronautics, Oakland, Calif. Mr. Krenz has had several years of experience in communication engineering and is a member of the American Institute of Electrical Engineers and the Air Corps Reserve. He has joined the Boeing school from Hancock College of Aeronautics, where he spent several years teaching aerodynamics and associated subjects and as head of the ground school department.

Master Courses Added at Parks

GRADUATES of the regular thirty-one-week airplane and engine mechanics' course at Parks Air College, East St. Louis, Ill., are eligible to take master courses in welding, sheet metal work, woodworking, airplane finishing and rigging, according to a recent announcement. The master courses are in the nature of post-graduate work, and the time required for each varies from ten to twenty-four weeks.

Penn School Enrolment Increases

PENN SCHOOL OF AVIATION has reported the enrolment of eight new flying students, according to F. R. Crawford, managing director of the school.

One of the instrument flying planes of the Boeing School of Aeronautics with a student at the controls, under the hooded cockpit

Lincoln Reports Year's Progress

THE LINCOLN AIRPLANE AND FLYING SCHOOL, a Government-approved transport school at Lincoln, Neb., reported for its fiscal year ending April 1 a satisfactory year with an enrollment of 162 students for the various resident school courses. These students were enrolled from thirty-nine states and seven foreign countries.

The Lincoln school offers home study extension training in aviation to students who find it impossible to take resident school training at the present time. Students from every state and from twenty-five foreign countries have enrolled in this department.

Four new training planes have been added to the Lincoln School's flight equipment. Flight training is given on four types of training planes, and blind flying by instrument is included in all advanced courses. Tuition rates at Lincoln have been reduced in keeping with the favorable changes as to required number of hours for the various flight courses under the Department of Commerce regulations for approved schools.

The school has been teaching aviation continuously for more than twelve years and is the school where Col. Charles A. Lindbergh first learned to fly. In all the flight training given at this school, no student has received an injury in connection with his flight training.

State College Flying School

IN ADDITION to operating charter flights, State College Air Depot, Inc., has opened a flying school at State College, Pa. The school, which is under the direction of Sherman Lutz, manager of the airport, recently reported six students enrolled in its fifty-hour course. One of them, who recently soloed for the first time, was Dr. Merit Scott of the physics department of Pennsylvania State College. Dr. Scott is adviser of the Penn State Aero Club, which gives instruction in aerodynamics, engines, structures, rigging, flying, gliding and related subjects.

Autogiro Instruction at Pittsburgh

HART AND HAMBURGER FLYING SERVICE, operating from Curtiss-Bettis Airport, Pittsburgh, Pa., recently took delivery on a Kellett two-place autogiro and are offering instruction. This is the first autogiro to be permanently stationed in Pittsburgh. Al Hamburger used the autogiro recently in photographing areas flooded by the Monongahela and Ohio rivers.

Rent-a-plane service is also offered by the company with the Monoprep and the Curtiss-Wright Junior.

Boeing School students are at the *learning* end of 50,000,000 air-miles

UNITED adopts an improved method of plane-ground communication . . . installs duplicate instruments . . . increases the performance of its transport planes . . . makes improvements in power plants and propellers . . . puts in more efficient service and overhaul practices . . . and Boeing School knows the reasons, the methods and the results.

Nowhere else is so great a body of practical flying knowledge made available, in a single training, to Ground and Flying students.

Add to this the advantages of a location directly on the Oakland Airport — offering all-year flying weather and an opportunity to observe the daily performance and servicing of the multi-motored, Coast-to-Coast passenger transports and single-engined mail planes.

Built for the future

It is from a school of this high type and thorough instruction that competent pilots and mechanics of the future must be recruited as the industry develops. That Boeing training meets the most rigid tests is evidenced by the substantial number of graduates now employed by leading air lines of the country.

ILLUSTRATED BULLETIN. Send for the new Boeing Bulletin, describing courses, costs, enrollment requirements and living conditions at the Airport. It will enable you to make your own advance comparison of Boeing training and any other. The coupon is for your convenience.

REDUCED PRICES APPLY ON *ALL* FLYING COURSES
Next regular enrollment, July 3

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SCHOOL OF AERONAUTICS

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. AIRLINES and AIR TRAVEL .

Western Airway Celebrates Anniversary

WESTERN AIR EXPRESS observed its seventh anniversary April 17, with Charles N. James and Fred W. Kelly making the same flights over the Los Angeles-Salt Lake City route that they did seven years ago. This anniversary observance rounded out the 10,650,206th mile of flight for the airline and the transportation of 79,177 passengers, 3,368,664 pounds of mail and 116,972 pounds of express.

Pacific Express Line Inaugurated

ONE OF THE LATEST air express services to be announced on the Pacific Coast is that of the S. F. Bay Express Line, which now maintains its base at the San Francisco Bay Airdrome, Alameda, Calif. The new service is being operated by Pilot Ed Dorrance and A. R. Lyle.

United to Announce Faster Service

WITH A FLEET of the new type Boeing Wasp-powered twin-engined transports already in service on the coast-to-coast airway of United Air Lines, the air transport company is preparing to announce shortly faster schedules which will be made effective on the New York-Chicago-Pacific Coast route within the next few weeks, according to P. G. Johnson, president of United.

Preliminary operation of the new low-wing all-metal monoplanes indicates that the present twenty-seven-hour service from the Pacific to the Atlantic will be cut by approximately eight hours or more. On certain flights along the coast-to-coast run, the planes have recorded cruising speeds of 180 miles per hour with only slightly favorable winds.

The first four planes completed by the Boeing Airplane Co. on United Air Lines' order for sixty were delivered to the Chicago-Pacific Coast, Seattle-San Diego, Chicago-New York and Salt Lake City-Seattle divisions of United for preliminary operation to familiarize the pilots and ground personnel with the operation of the new equipment. These planes were delivered during the first week in April. It is expected that the entire fleet will be in operation on the various routes of United Air Lines before autumn.

Pilots Save Life and Property

WHILE FLYING his regular run on the New York-Cleveland division of United Air Lines recently, Pilot H. P. Little noticed a forest fire and a burning lodge near Clarion, Pa., in the Allegheny Mountains. He circled over the burning area until people were aroused and were able to extinguish the fire before it had a chance to spread in the heavily wooded area. Wilbur Alexander, inspector of the Department of Forest and Water of the State of Pennsylvania, officially commended Pilot Little.

The life of C. J. Kromei, aged resident of Ustick, Ida., was saved by Pilot Abe Warner of United Air Lines while flying the Boise-Portland division. He noticed a blaze several miles from his course and veered off to investigate. Warner dived over the village several times until the attention of a number of people was attracted. They rushed to the fire and carried Kromei and much of his furniture out before the house was destroyed, while Warner resumed his flight.

Manning a Pan American Director

L. B. MANNING, chairman of the board of American Airways, Inc., and president of Aviation Corp., was elected a director of Pan American Airways, Inc., at the annual stockholders' meeting last month. Mr. Manning, accompanied by Mrs. Manning, in January, made a complete survey of the Pan American system, traveling by air more than 17,000 miles.

Kohler Changes Two Terminals

LAST MONTH the Kohler Aviation Corp. discontinued use of its terminals in Milwaukee and Detroit, the Milwaukee County Airport and the Detroit City Airport. Instead, the company is using the Milwaukee Air Marine Terminal, which is situated in the heart of the city, and in Detroit, the new Kohler Air Marine Terminal, built last year, at 3925 West Jefferson Avenue. The latter terminal is only a five-minute taxi drive from the Michigan Central depot and an eight-minute drive to the heart of Detroit's business section. The two terminals will continue to be used until late in the fall.

January-February Airline Statistics

SCHEDULED AIRLINES operating in continental United States carried 24,300 passengers in January and 23,406 passengers in February, it was announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. These totals are based on reports from all the thirty-one companies operating in January and twenty-nine of the thirty in operation during February. Miles flown by these lines during January were 3,656,262, express carried totaled 74,268 pounds, and passenger miles flown were 7,854,069. Miles flown in February were 3,331,518; express carried, 82,237 pounds, and passenger miles flown, 7,460,225. Gains over 1932 were shown for both months in mileage and passenger mileage flown and in express carried.

Norfolk-Washington Beacons Turned Off

ALL LIGHTS at airway beacon and intermediate landing field sites on the Norfolk-Washington Airway were extinguished last month until further notice. The intermediate landing fields will remain available for day landings.

Air-Water Circle Tours Planned

ARRANGEMENTS have been completed through the general traffic office of United Air Lines for air-water combination trips by using United Air Lines across the country to New York, Los Angeles or San Francisco, at which points steamers of the Panama Pacific line may be boarded for the return trip through the Panama Canal.

Northwest Airways Changes

PERSONNEL CHANGES of the Northwest Airways, Inc., in addition to those announced in the April AERO DIGEST, include the appointment of K. R. Ferguson as acting traffic manager, H. M. Bennett as radio foreman and J. B. La Mont as superintendent of shop maintenance. George Wier and C. H. French of the Chicago office have been transferred, respectively, to Minneapolis and the newly opened Billings, Mont., office.

Installation of quickly removable blind flight instrument panels has been completed on the planes of the airline under the direction of M. G. Boe.

Round-trip and one-way fares between Duluth, Minn., and Chicago have been reduced by the company.

Bowen Passes 2,000,000 Flight Miles

BOWEN AIRLINES, operating from Oklahoma City to southern cities, recently completed 2,000,000 miles without a mishap, with a passenger list of 35,000 persons. Temple Bowen, owner and manager, opened the airline in 1930 with a 300-mile schedule and one plane. Today it covers 3,000 miles daily with eight Lockheed planes. Each of the Bowen pilots, instructed in the instrument flying school operated by Bowen at Fort Worth, Tex., in which pilots of other lines also receive instruction, have flown over their entire network not less than 500 times.

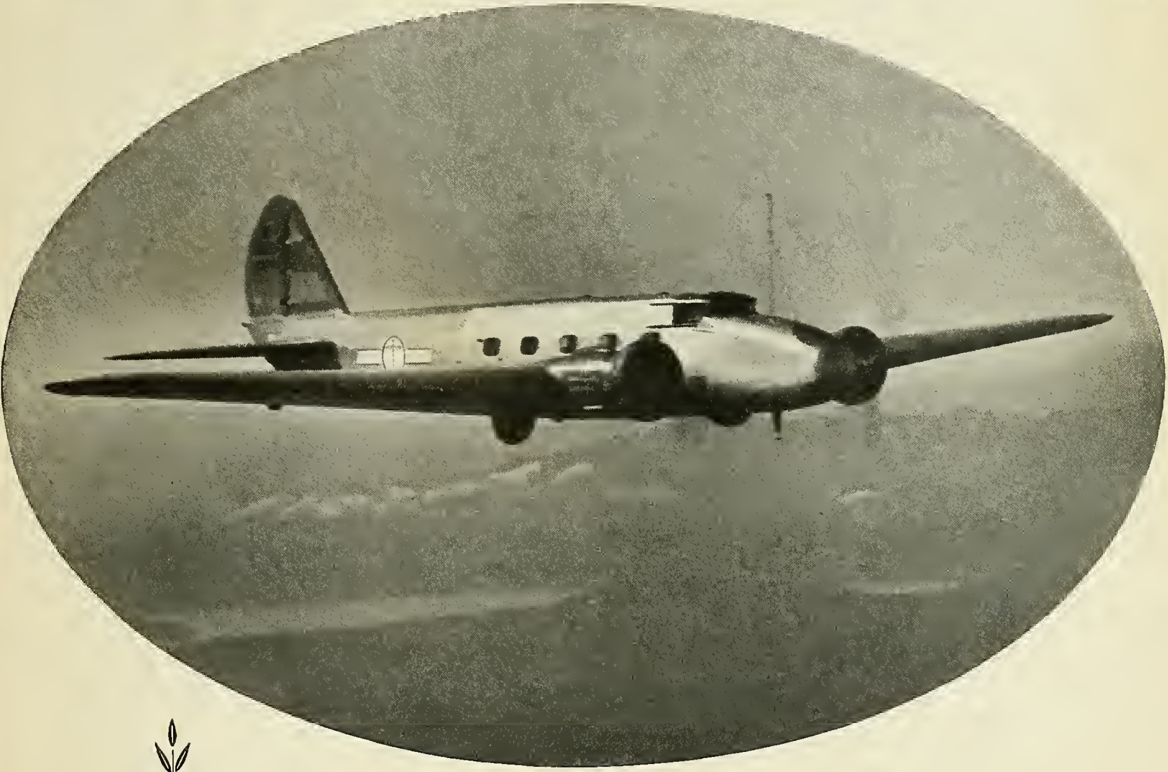
Rapid Air Lines Adds to Service

AT THE REQUEST of St. Joseph, Mo., business men, Rapid Air Transport will make that city a regular stop on all schedules. Heretofore this city has been a flag stop only.

Rupert Stitt, formerly in the Omaha traffic office of the airline, has been transferred to Kansas City. This will allow

(Continued on following page)

PERFORMANCE PLUS!



The outstanding performance of the new Boeing transport — in speed, payload, strength and operating economy — is definitely established by the following figures:

OFFICIAL PERFORMANCE

(With gross weight of 12,650 lbs.)

High Speed	**182 m.p.h. at 5,000 ft.**
Cruising Speed	**165 m.p.h. at 5,000 ft.**
Landing Speed	**58 m.p.h.**
Takeoff Run	**770 feet**
Rate of Climb	**830 f.p.m. at 5,000 ft.**
Climb in Ten Minutes	**8,000 feet**
Service Ceiling	**18,400 feet**
Absolute Ceiling	**20,500 feet**

The above figures represent the performance of the plane carrying ten passengers, their baggage, a crew of three and 400 pounds of cargo, with normal fuel load of 203 gallons of gasoline and 20 gallons of oil.

WEIGHTS

Weight Empty	**8,370 pounds**
Useful Load	**4,280 pounds**
Payload	**2,400 pounds**
Gross Weight	**12,650 pounds**

(Signed) P. G. Johnson

President, Boeing Airplane Company

GENERAL DESCRIPTION: The Boeing 247 is an all-metal, low-wing monoplane having retractable landing gear and two Pratt & Whitney Wasps developing 550 horsepower at 5,000 feet. Wing span, 74 feet; length 51 feet 4 inches. Complete navigation instruments. Spacious ventilated and insulated cabin. . . Detailed specifications furnished on request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.

BOEING

BOEING *has always built tomorrow's airplanes today!*

(*Continued from preceding page*)

the traffic manager at Kansas City, M. R. Garnett, to give more time to supervision of traffic over the entire line.

Speed of the Lockheed Vega, now used on the Omaha-St. Louis schedule, has cut operation costs considerably. Express business at all points on the line increases each month.

American Airways Service Head Chosen

BARNEY GRAVES, formerly in charge of ground transportation for American Airways, has been appointed superintendent of service for that company, according to Lester D. Seymour, president. His new duties in American Airways will place under Mr. Graves' supervision all service to passengers, mail and express throughout the entire coast-to-coast system of the airline. He will have his headquarters at the Chicago general offices of the company.

Jesse A. Maxwell, formerly with American Airways at Tuscaloosa, Ala.; Dallas, Austin and Big Springs, Tex., has been appointed station manager for the airline at Candler Field, Atlanta. He succeeds Paul Carpenter, who has been transferred to Los Angeles, Calif.

Pan American Obtains Chinese Interest

ANNOUNCEMENT was made recently by J. T. Trippe, president of the Pan American Airways System, of the acquisition by the Pan American Airways Corp. of forty-five per cent of the capital stock of China National Aviation Corp., whose operating routes and important franchises cover the basic air transport development of the Chinese Republic. All the capital stock not acquired by Pan American is held by the Chinese National Government. The acquisition was effected through an exchange of stock.

Employing American aircraft, manned by American pilots, China National Aviation Corp. is the company which succeeded the early development of commercial air service in the Chinese Republic. The first service in which Americans were associated was inaugurated between Shanghai and Hankow in 1929. In July, 1930, new operating contracts and franchises were acquired from the Government, and China National Aviation Corp., as it now exists, was formed to operate the new routes and develop the various extensions provided. In the new company, North American Aviation, Inc., retained the American interests which Pan American has now acquired. The commercial and administrative departments of the company are directed by the Chinese, while the operations will be managed by Pan American. It is likely, also, that Pan American will introduce larger and more efficient equipment, similar to that employed on the inter-American trade routes, into the China service.

Through China National Aviation Corp., the partnership between the American international airlines system and the Chinese National Government will be directed toward improvement of present operating routes and development of a more adequate domestic system to link the principal cities of the republic with fast, dependable air transport service. The Chinese national system is now operating, or will shortly place in regular operation for passengers and express, a daily service on the 567-mile route to Shanghai, Nanking, Hankow; thrice-weekly service between Shanghai and intermediate cities to Peiping, a distance of 790 miles, and twice-weekly service between Nanking and along the Yangtse River to Chungking, 556 miles. In addition to these lines, the company holds exclusive franchises for an extension route into Chingtu, capital of the powerful Szechwan province, and for the straight coastal route from Shanghai to Canton and Hong Kong. These routes, covering 1,913 miles of airways, serve territories with more than 150,000,000 population and where much of the transportation, even between principal cities, is still confined to slow river boats. American business interests furnish more than thirty per cent of the passenger and mail traffic on the Chinese airlines at the present time.

Pan American some time ago concluded an agreement with the Japanese national air transport interests providing for cooperation between American and Japanese airlines in the Far East. Technical experts of the Japanese air transport lines have had several conferences on Far East operating problems with Pan American officials in this country.

Detroit-Cleveland Air Service

DIRECT TRANS-LAKE airline service between Cleveland and Detroit will be started by American Airways on May 3, connecting the two cities in 55 minutes. New twin-motored Sikorsky amphibians, carrying eight passengers, two pilots, express and baggage, have been purchased for this line.

At Detroit, the City Airport will be used as the terminal, the planes taking off and landing as land planes. At Cleveland the planes will land and take off on the lake, operating from the air depot at the foot of East Ninth Street.

This service was inaugurated in the summer of 1929 by Trans-American Airlines, now a part of American Airways. Since that time a total of 19,103 passengers has been carried.

The regular American Airways schedules between Cleveland and Detroit, via Toledo, will be maintained without curtailment. Three flights daily in each direction are now operated over the latter route.

New N. Y. American Airways Office

THE NEW YORK traffic office of the American Airways was moved to new street level offices at 45 Vanderbilt Avenue, according to announcement by F. Warren Oakes, Jr., vice president in charge of traffic. This marks the complete removal of the company's offices from the Chanin Building in 42nd St., where they have been located for several years.

Western Air Express Shows Gain

A PROFIT of $43,271 for 1932 was reported by Western Air Express Corporation, after charges and loss of Aero Corp. of California, Inc., had been deducted.

Airline Helps in Meteorological Study

SEEKING to prove or disprove a theory that Utah, the northwestern tip of Arizona, Nevada and Southern California is in one of the three "closed circulation" areas of the world, the Western Air Express meteorological department is cooperating with scientists of the California Institute of Technology and the Scripps Institute of Oceanology in conducting extensive tests over the region involved with an aerometeorograph. This new German instrument, first used by Prof. Auguste Piccard in his stratosphere flights, automatically records air pressure, humidity and temperature on a metallic paper-covered revolving drum which makes one complete revolution every hour and a half.

The "closed circulation" belief holds that cold air from the high Utah plateau regions sweeps over the Great American Desert at low altitudes to Southern California. Upon reaching the Pacific Ocean it is warmed by the ocean currents, rises, and is forced back to the plateau region, where it is stopped by the Rocky Mountains. There it descends, is cooled and repeats the process, sweeping southwesterly. The only other regions where this circulation is known to exist are in Norway and Greenland.

Upon proving true or false the circulating theory, the research meteorologists believe they will have data which will be important in weather forecasting and to aviation, through forecasting of altitudes which must be flown to secure tail winds.

Plane Added to Eastern Air Schedule

EASTERN AIR TRANSPORT has included another plane on its schedule between Washington, D. C., and New York, N. Y. The new plane leaves Washington at 6 p. m., arriving at Newark airport at 8:10 p. m.

The airline is reported to be using some of the planes obtained in taking over the Ludington Airlines for charter work on special flights.

A Simplified System for Landing Blind

Howard C. Stark, ***Instructor in Instrument Flying, Eastern Air Transport, Inc.***

THE INFORMATION contained in two articles in AERO DIGEST by the writer — "Instrument Flying" (May, 1931) and "Location of the Radio Beacon Station," by using the system of fading and increasing radio signals (December, 1932),—was based on several years' experience in actual blind flight while flying the mail.

In regard to landing blind, however, I can merely express my opinion on the subject, having had no practical experience in using any prearranged mechanical means for assisting such landings, although I have made a number of blind landings, several while flying a Fleetster on floats, and carrying mail for the NYRBA line in South America.

Blind landings on water are not especially difficult provided the pilot knows he is over the water, as he usually has plenty of room to descend slowly. From having made a considerable number of landings under very poor weather conditions on a number of different airports, I know that the pilot of a landplane must have available a great deal more information in order to make a blind landing.

On the night of last December 29, while flying the mail from Richmond, I made a landing on the airport at Candler Field, Atlanta, under zero-zero conditions; that is, "no ceiling" and "no visibility." This landing proved, at least to my satisfaction, that it is possible to land blind when aided by lights especially arranged for the purpose. Usually when there is fog there is little or no wind, and therefore the possibility of trouble from this source can be disregarded. If the wind should blow about 10 miles an hour, it will be found that ceiling conditions will improve quickly.

Airliners are already equipped with the necessary instruments, and airline pilots are trained to enable them to take off blind at one airport, and by using the radio beam, fly blind 200 miles or more to another airport, arriving directly over the radio beacon station. But under present conditions he is unable to land in fog, as no information is available to him by means of which he can fly accurately the relatively short distance between the radio beam station and the runway.

For some time F. J. Andre, of Atlanta, and I have been experimenting with a simple landing system, and arrangements are being made to try it out under actual blind landing conditions. The system consists of placing a row of lights on a direct line from the radio beam station to the airport runway.

Starting at the radio beam station, searchlights will be placed approximately 100 feet apart for a distance of 1000 feet or more, and a series of smaller lights, similarly spaced, for the remaining distance to the boundary of the runway. Between each light one or more red neon lights will be placed. The airport boundary will be indicated by placing a short row of lights at right angles to the line of lights described, thus forming an illuminated "T."

In order to avoid confusion with other lights that may be in the vicinity of the airport, and for daylight use, these searchlights will have colored lenses to color the fog or clouds in a distinctive way. All these lights will be placed on poles higher than surrounding trees, wires, buildings, etc., excepting, of course, the lights that taper down to the airport boundary. It would be possible to fly within a few feet of lights in this position without danger of encountering obstructions.

The use of this system requires that the pilot arrive over the radio beam station at an altitude of about 500 feet, headed in the direction of the airport. At night he can see the glow of the searchlights or in daylight the red lights which color the fog for a certain distance. Having established his position in relation to the field by the cone of silence at the radio station, he can then glide down until the line of neon lights can be seen and followed to the runway, which places the airplane in position for landing.

A particular advantage of the system of lights proposed here is that it requires no additional equipment on the airplane and gives the pilot a positive identification of his position just before he lands. The light system would take care of 95% of the blind landings and is of the utmost value at night. However, it does not take the place of the Department of Commerce landing beam (described in the past two issues of AERO DIGEST), which is a very practical way of landing blind. The lights fit in with the Department of Commerce system to give the pilot a definite check on his position and to provide a double means of landing blind in case either system should fail.

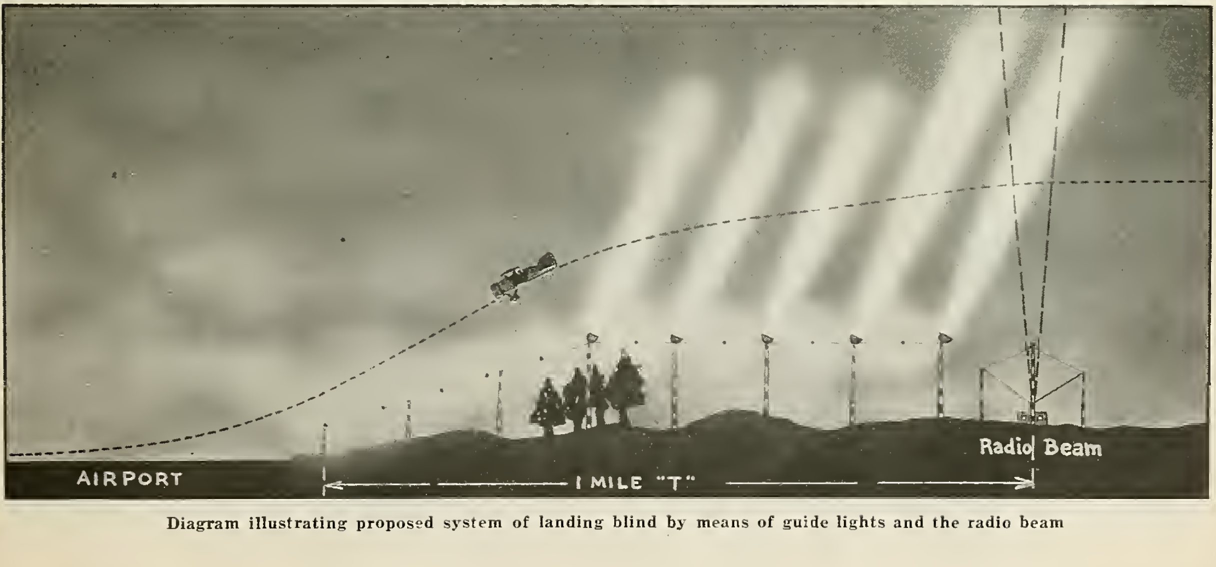


Diagram illustrating proposed system of landing blind by means of guide lights and the radio beam

THE MODERN AIR TRANSPORT

Provides more passenger comfort, increased safety and operating efficiency

Captain Thomas B. Doe

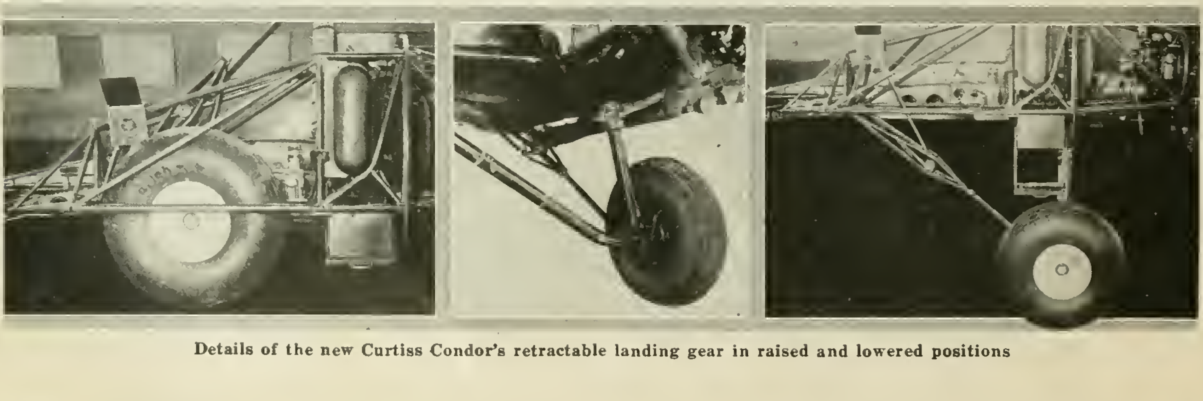
President, Eastern Air Transport, Inc.

SPEED with safety is naturally the chief factor in favor of air transportation, but in order to insure further progress it is essential that refinements in comfort be provided for passengers. In all of our operations, we have considered passenger comfort as a problem of prime importance. In attaining the necessary speeds and comforts desired for the passenger, a modern transport plane which can be operated economically must be provided. We had this in mind when making recommendations to the Curtiss-Wright Airplane Co. before and during the construction of the new 15-passenger Condor. This transport has a normal cruising speed of 150 miles per hour, carries a pay load of 3,200 pounds, and at the same time provides unusual facilities for the comfort of passengers and crew.

Research by the Guggenheim Fund disclosed the fact that poor ventilation is one of the principal causes of air sickness and that another source of discomfort is the cold cabin floor. To cope with these conditions, in the new Condor hot air ducts in the walls of the cabin near the floor, provided with louvers at each seat, direct heated air horizontally across the floor. The warm air rises and escapes through ventilators in the roof. The air volume may be regulated by each passenger to suit his individual desires. The temperature is regulated by a thermostatic control so that an even temperature is maintained when the ship is on the ground or in the air. This is of special importance when traveling from warm to cooler climates such as from Miami or Atlanta to New York. Cold air ducts from the forward end of the fuselage where clean air is available are installed in the cabin walls above the windows, so that passengers can control the direction and volume of cold air admitted. Air entering the cold air duct is filtered to prevent moisture from entering the cabin, and all air ducts are soundproofed to prevent noise from entering through them. This system of furnishing hot and cold air has proved satisfactory, as it keeps all the passengers comfortable, whether they desire a large or small supply of warm air. In summer, cold air is supplied through the hot air ducts. Two ventilators are installed in the cabin ceiling, so that a complete change of air occurs every three minutes. The ventilation system's efficiency and the fact that all the upholstering is fireproofed, makes it possible to permit smoking in the ship. Ash trays are installed on the walls at every seat.

We have found that passengers on long trips occasionally desire to walk about the plane while in flight, standing erect and stretching so as to relieve tired muscles. Inasmuch as the passenger compartment of the new Condor has headroom of six and one-half feet, and the aisle is of sufficient width, the average passenger may stand erect and walk about without inconveniencing others.

It has also been learned that hard-surfaced chair arms cause discomfort, due to the nerves in the elbow. In the new Condor, chair arms are heavily padded with sponge rubber before being covered by leather. To add further to the comfort of the passengers, chair arms are level with the window sill, thus affording an extra-wide arm rest. Chairs are designed to permit the passenger to place his feet under the chair ahead of him. Chairs are reclinable to a large degree, so passengers may adjust them



Details of the new Curtiss Condor's retractable landing gear in raised and lowered positions

to a comfortable angle and stretch out and sleep in them.

Push buttons are provided at each seat to signal the hostess. When the co-pilot also acts as steward, these signal buttons connect with a light on the pilot's instrument panel. Should the pilot desire to signal the hostess or co-pilot when he is in the passenger compartment, he presses a button which lights an amber light in the compartment. The lighting system consists of two large dome lights set flush in the cabin ceiling and individual reading lamps in the walls next to each seat. The rays of these individual reading lamps are so focused as to provide sufficient illumination for passengers wishing to read at night without disturbing others. Tables are furnished for those who desire to play cards or to write reports, letters, etc. A compartment in the rear of the cabin is provided so the hostess may prepare light lunches to be served en route. In addition to these features, full lavatory facilities are provided.

In making specifications for this new transport, we have had in mind the fact that noise and vibration probably have kept more people from traveling by air than fear or cost. To reduce propeller noise, three-bladed propellers are used in conjunction with geared engines; this allowed a reduction in the propeller tip speed from 850 feet to 670 feet per second. To decrease engine noise, exhaust stacks are run under the lower wing away from the passenger compartment. In addition, the passenger cabin walls, ceiling and floor are soundproofed with "Seapak," a newly developed insulating material. The result is that by actual measurement with special instruments this new plane's cabin noise is no greater than that which is familiar to Pullman car passengers. Conversation may be carried on while in flight without raising the voice, for it is no longer necessary to stuff one's ears with cotton to shut out the noise. To reduce vibration, the engines are mounted on rubber blocks, thus damping out considerable vibration at its source. All windows are set with rubber between the frames and glass, thus further decreasing vibration.

Baggage, mail and express are carried in the bottom of the fuselage in three compartments, accessible from either side of the ship. In this location, it is unnecessary to interfere with passengers while loading and unloading. Having baggage compartments in this location makes it much easier to keep the passenger compartment at an even temperature. It also assists in soundproofing the cabin.

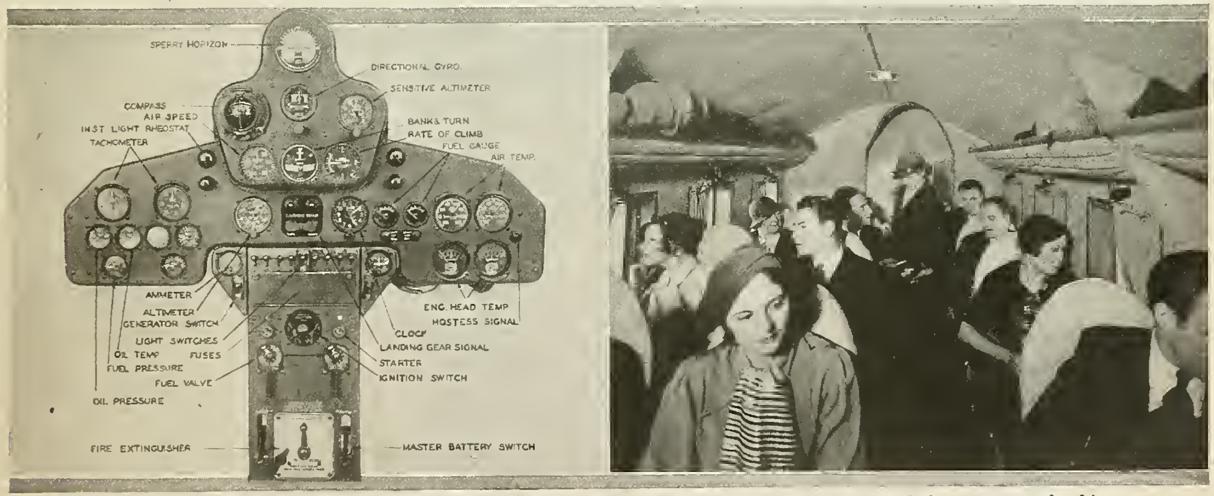
It is important that comfort be provided for the pilot and co-pilot, so that they may conduct their activities with the utmost safety and alacrity at all times. Control pedals may be adjusted by turning a screw knob above the pedals so that pilots with short or long legs can fly the Condor with equal ease. Pilot's seats are quickly adjustable and may be raised or lowered to suit. In many transport planes, when passengers walk from one end of the cabin to the other, it is necessary to readjust the stabilizer to compensate for the shifting of weight. This causes additional work for pilots. However, in this new Condor, shifting of the weight by several passengers' changing their places during flight is easily counterbalanced by turning at the pilot's side a small wheel which actuates auxiliary control surfaces set into the rudder, elevators and ailerons. Amber glass is set above the pilot's cabin to prevent glare. Side windows of the pilot's cabin are adjustable, and the cabin is heated. The instrument panel is mounted on rubber so that vibration will not impair the accuracy of the instruments.

In addition to the features for comfort, the Condor conforms to the operator's requirements from the maintenance and operation standpoints. Wings and tail surfaces contain some 125 inspection pockets that permit thorough inspection within a short period of time. All controls, electric wiring, etc., are readily accessible through inspection plates, etc. All control surfaces hinge on sealed Fafnir ball bearings requiring no servicing throughout the life of the ship. A 12-volt, 65-ampere Exide battery is installed in each engine nacelle and connected in parallel so that either will provide current for all electrical accessories and lights. Generators are also connected in parallel so that either will charge both batteries. A new type battery connection has been developed by Curtiss-Wright engineers so that batteries may be changed in less than a minute without the use of tools. The landing gear is of simple construction, and each side is an independent unit. The wheels are raised and lowered electrically. The gear may also be retracted or drawn up mechanically by a crank at the pilot's seat. The landing gear is of the conventional tripod type.

The two 700-horsepower Wright Cyclone engines which power the ship are so mounted that they may be taken out and replaced with comparative ease. Servicing is also made convenient.

Thus in the new Condor we have an attractive 15-passenger transport with a top speed of 170 miles an hour, a cruising speed of 150 miles an hour, an exceptionally low landing speed and one in which comfort for the passengers and pilots has been achieved, and which has been built from a maintenance and operations standpoint to serve the present and immediate future needs of airline operators.

On a recent 3,500-mile trip along the eastern seaboard, many passengers were taken for flights in the new Condor and from their many complimentary remarks we are more convinced than ever that the ship adequately fulfills the purpose for which it was designed.



Instrument panel of the new Curtiss Condor and a view showing the roomy interior of the passengers' cabin

JAPANESE MILITARY AIRPLANES

By

H. Takamatsu

Aero Digest Correspondent

IN THE PREVIOUS ARTICLE on Japanese military airplanes, appearing in the December, 1932, issue of AERO DIGEST, mention was made of the Type 88 reconnaissance plane produced by the Kawasaki Dock Yard. This plane is a two-seater machine used by the Japanese Army for long-distance reconnaissance. A new short-distance reconnaissance machine, known as the Type 92, has been added to the list of service planes.

Mitsubishi Reconnaissance Type 92

This machine was designed by the Mitsubishi Aircraft Works at Nagoya and was accepted as a formal short-distance reconnaissance two-seater landplane last August, after extensive flying tests for about one year. It is an all-metal high-wing monoplane with the wing having a small degree of sweepback. The center panel is supported by six cabane struts, and the panels on both sides are braced by two struts with no wires. Wing struts are built in as part of the landing gear system. The landing struts form a tripod with the shock-absorbing legs set vertically.

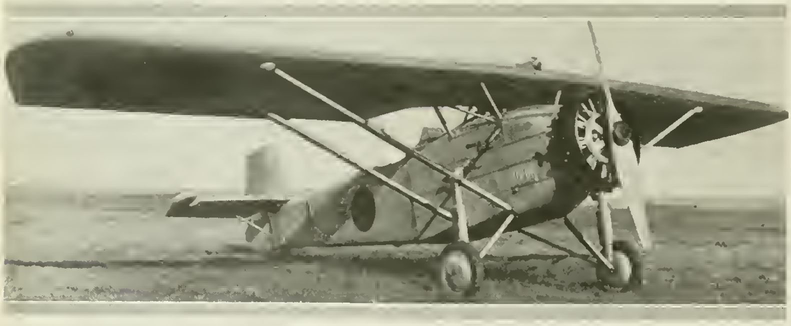
The body is not especially well streamlined, but it has ample space to include the various accessories required for reconnaissance purposes. The central portion of the body is of square section and accommodates the seats for pilot and observer.

A Mitsubishi 400-horsepower Type 92 air-cooled engine with an anti-drag cowling and a duralumin one-piece propeller are used. The engine develops its maximum power at 2,200 r.p.m. and cruises at 2,000 r.p.m. Its weight is 764 pounds. All the control surfaces are balanced, and the ship is capable of withstanding the strain of all aerobatic maneuvers.

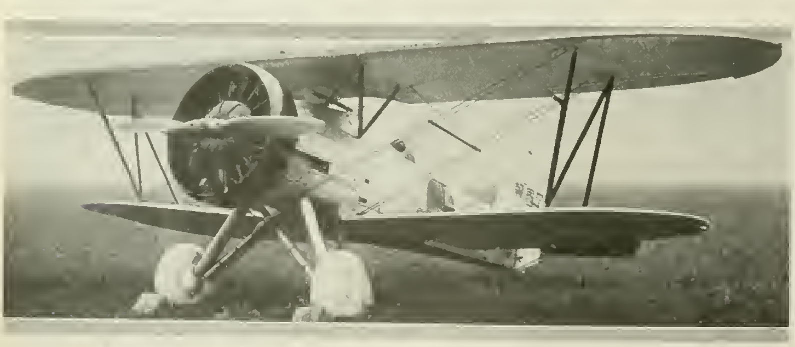
The general type of this design follows the line of development of French two-seater reconnaissance planes where a definite tendency is apparent toward monoplane arrangement. Extensive flying tests which this machine has been subjected to bears out the desirability of such an arrangement and while the performance figures do not indicate excessively high performance, yet the figures are fully within the limits of typical airplanes of that category.

Specifications

Gross weight	4,300 pounds
High speed	137 miles per hour
Time of climb to 9,840 feet	10 minutes



400 horsepower Mitsubishi two-seater reconnaissance monoplane Type 92



Nakajima single-seater fighter Type 90, used from aircraft carriers

Nakajima Carrier Fighter Type 90

The Nakajima fighter Type 91 mentioned in the previous article is an Army machine. The Type 90 single-seater biplane fighter is designed to operate from aircraft carriers. The landing struts crossing under the body, the arrangement of wing bracing wires and main wings are somewhat similar to the American Curtiss Hawk. It is powered with a radial air-cooled 450-horsepower Nakajima "Jupiter" engine provided with anti-drag cowl ring.

Main wings have a pronounced stagger, and *N* type interplane struts and double streamline wire bracing are used.

Machine guns are located in the sides of the fuselage as in British practice.

Specifications

Wing span	30 feet 10 inches
Length overall	21 feet 5 inches
Height overall	11 feet 1 inch
Gross weight (approx.)	2,200 pounds
High speed	205 miles per hour
Minimum speed	50 miles per hour
Time of climb to 9,840 feet	4 min. 10 sec.

Nakajima-Fokker Ambulance Plane

Many Fokker type passenger airplanes are produced by the Nakajima Aircraft Works at Otamachi. Owing to the necessity of carrying wounded soldiers, the Nakajima Fokker Super-Universal was redesigned under the supervision of an Army surgeon, Dr. Terashi, and constructed at the Nakajima Aircraft Works. This type is too well known in the United States to require a technical description, but it is interesting to observe the adaptability of the ship to its purpose.

Kawasaki Heavy Bomber Type 87

The largest landplane of the Japanese Army was designed by Dornier engineers engaged by the Kawasaki Dock Yard Co., Ltd. The designation "Do.N" given to this machine was derived by combining the first two letters of "Dornier" and the initial letter of "Nippon" (Japan). The Do.N is an all-metal high-wing monoplane, powered by two Kawasaki B.M.W. 600-horsepower engines in tandem arrangement. Originally built in 1925 as a commercial landplane in Germany, this ship, powered with two 600-horsepower engines, was known as the Do.F. It was able to transport 16 passengers and two pilots.

Specifications

Wing span	93 feet 6 inches
Length overall	65 feet 2 inches
Height overall	20 feet 2 inches
Wing area	1,535 square feet
Weight empty	11,225 pounds
Normal loading	8,260 pounds
Speed	109 miles per hour

Naval Flying Boat Type 90-1

The three-engined all-metal monoplane flying boat Type 90-1 was designed at

Japan's largest military flying boat, the tri-motored Hiro Type 90-1

Kawasaki heavy bomber Type 87 with two 600-horsepower engines

the aircraft factory of Hiro Naval Arsenal. The machine, which carries a crew of six men, was flown for the first time last spring. Recently a comparison was made of performances between this flying boat and a Short flying boat imported from England. Indications were that the performances of the Japanese ship were more favorable than those of the Short flying boat. Three 700-horsepower Hispano-Suiza engines, built in Japan, are used.

Specifications

Wing span	98 feet 5 inches
Length overall	68 feet 10 inches
Weight fully loaded	26,880 pounds
High speed	136.5 miles per hour

Digest of Technical Articles from Foreign Publications

By Elsa Gardner

AIRPLANE PERFORMANCE

On the Acceleration of an Aeroplane Upon Entering a Vertical Gust. L. W. Bryant and I. M. W. Jones (British) Aeronautical Research Committee—Reports and Memoranda No. 1496, February, 1932 (Published March 28, 1933), 16 pp., 16 figs.

EFFECT of such factors as degree of stability, size and wing loading on the accelerations of an airplane arising from vertical gusts was investigated in order to interpret the accelerometer records in terms of gust velocities. For a moderately stable airplane, the hypothesis of a sharp-edged gust gave a gust velocity within 10 per cent of the truth, provided the time or corresponding distance traveled were less than certain values depending on the speed of the airplane and its length. An unstable airplane gave very large maximum loads even for slowly increasing gusts. Increased wing loading decreased the acceleration due to a sharp gust. The longest airplane was subject to the smallest loads in the sharpest gusts, but effect of size was in general small. Acceleration due to a gust which began by increasing slowly and then rising very rapidly exceeded that given by the sharp-edged hypothesis for the same maximum gust velocity. Acceleration due to very sharp gusts appeared to depend very much on the rate of growth of circulation around a wing subject to a rapid change of incidence.

PROPELLERS

Improvement of Airscrew Body Performance by Means of Radial Vanes. F. C. Johansen (British) Aeronautical Research Committee—Reports and Memoranda No. 1495, December, 1931 (Published March 28, 1933), 27 pp., 13 figs.

OVER THE NORMAL RANGE of propeller working conditions, measurements of net thrust were made with various types of vanes fitted to one tractor and two pusher combinations of a body (fineness ratio 3) and a four-bladed propeller (P/D equals 0.7). The experiments showed that suitable vanes reduced slipstream rotation, increased the pressure over the surface of the body, especially at the tail, and so reduced the profile drag of the body. Definite improvement of overall performance was apparent, the largest increase of net thrust at maximum efficiency being four per cent for the tractor propeller, 10 per cent for the forward pusher and one per cent for the after pusher. Vanes in contact with the surface of the body were more effectual than those mounted at some distance away, and in the tractor combination the best results were obtained when the vanes were mounted around the maximum section of the body. When the smooth contour of the tractor body was interrupted by an annulus aft of the propeller, the vanes were still effective in improving the overall thrust.

FRENCH RESEARCH

The Technical and Scientific Research at the Twelfth Aeronautical Exhibit (La technique et la recherche scientifiques au XII^e Salon de L'Aéronautique), P. Leglise L'Aéronautique), Vol. 15, No. 166, March, 1933, pp. 55-60, 45 figs.

THE EXPOSITION described covered the aeronautical research being undertaken under the auspices of the French Air Ministry and was shown at the recent Paris Aircraft Show. This article is accompanied by many illustrations of the apparatus used in carrying out the experiments and photographs of the results obtained. This instalment describes the work of the Institute of the Mechanics of Fluids at the University of Paris and takes up the research directed by Riabouchinsky dealing with experiments on the motion of autorotation, as well as the origin of cavitations and sudden local variations of density in gases. Under his direction are also included an extension of the method of Hele-Shaw to cyclic motions by Madame Popovitch-Schneider and a method of recording the deformations and vibrations of a wing in flight. Research supervised by Bénard on vortex sheets is also reviewed.

ALUMINUM ALLOYS

The Fatigue-Resisting Properties of Light Aluminum Alloys at Elevated Temperatures. J. W. Cuthbertson. Engineering, Vol. 135, No. 3506, March 24, 1933, pp. 342-343, 4 figs.

THE LOAD DEFLECTION METHOD of rapid fatigue determination, modified so that loading was continuous, was applied to the examination of light aluminum alloys for the reported investigation. It was found that raising the temperature increased the rate of creep under any given stress. The effect was small at first but at higher temperatures a point was reached where marked creep became apparent, the deflection-temperature curve showing a well defined change of form. The point at which the extent of creep becomes sufficiently great to exert any serious influence on the load-deflection results is seemingly characteristic for each material, varying from 290 to 330 degrees Centigrade.

PROPELLERS

Theoretical Curves Illustrating the Periodic Flow Behind an Airscrew, C. N. H. Lock and D. Yeatman. (British) Aeronautical Research Committee—Reports and Memoranda No. 1483. February, 1932 (issued February 23, 1933), 15 pp., 8 figs.

CALCULATIONS are given for the form of filament lines for a simple case of potential flow in two dimensions, made in connection with the photographs of filament lines behind a propeller described by Townend in R. & M. 1434. The case chosen was that of flow past the edges of a series of equally spaced flat plates extending to an infinite distance in the direction away from their edges. This velocity field furnishes an approximation to the actual velocity field behind a propeller, and the calculated filament lines show many of the features of the observed filament lines, such as the breaks which form a conspicuous feature of the observed lines when they cross the helical trailing vortex sheets left behind by the blades of the propeller.

HYDRODYNAMICS

On the flow of Water through Tubes, D. Nukiyama. Tokio Imperial University, Aeronautical Research Institute—Report No. 90, Vol. 7, No. 9, January, 1933, pp. 233-290, 29 figs.

THIS REPORT deals with the velocity distribution of water flowing through tubes of circular and square cross-sections, both with and without obstacles placed in the stream. The method used consisted of photographing aluminum particles suspended in the fluid. A light ray in the form of a thin plate was sent from a side of the tube through a glass window, and the images of the aluminum particles about this light ray were taken on a photographic plate placed in the direction normal to both the tube and the incident light ray. General results showed agreement with theoretical values, and a special study of the boundary surface of a square tube indicated that the slip at the boundary surface, if any, was not of such a magnitude as could be observed directly from the photographs. Experimental results brought out the differences of the velocity distribution near the boundary surfaces of glass and brass. The last part of the paper deals with the velocity distribution in the annular portion of a cored circular tube.

BIPLANES

The Biplane of Finite Span (Sui problema del biplano di apertura finita), C. Ferrari. L'Aerotecnica, Vol. 13, Nos. 1 and 2, January and February, 1933, pp. 39-57, 6 figs., 6 tables.

MILLIKAN'S THEORY of the infinite biplane (in which all the influencing wing is reduced to a vortex and a doublet concentrated in the center of the airfoil section) is modified to obtain a vortex applied to the focus, according to the Pistolesi theory, and a doublet of a moment proportionate to the focal moment applied to the center. The investigation is extended to the biplane of infinite span by assuming elliptical distribution on both wings. The author calculates the velocity and curvature which the inducing system generates in any point of the influenced wing and determines its average value in the center section. He applies the Glauert method to determine the aerodynamic characteristics of force and moment of the wing. He concludes that the mutual influence has an effect equal to zero on the slope of the diagram of moment coefficients in functions of the lift coefficients, while the coefficient of the focal moment varies in proportion to the stagger of the two wings.

AERIAL SURVEYING

Aerial Survey in Relation to Economic Geology, D. Gill. Royal Aeronautical Society Journal, Vol. 37, No. 267, March, 1933, pp. 227-264 and (discussion) 264-287, 5 figs. Bibliography.

THOSE ASPECTS of the technical side of aerial surveying are discussed which are most likely to concern the geologist and of which he should have some knowledge before undertaking to employ aerial survey. The author takes up the use and interpretation of aerial photographs by the geologist and advances some tentative conclusions regarding the conditions which are necessary to enable geological inferences to be made from the air. He believes that aerial geology may be used at present for prospecting for oil in the western parts of this country, for route-finding and elimination of unpromising areas by visual reconnaissance in Canada, for Canadian geological mapping, for reconnaissance geological mapping where geology is not too complex as in Morocco, and for mapping ancient drainage systems, as in Uganda.

AERODYNAMICS

Research on the Motion of a Fluid Under the Action of Gravity in a Vertical Plane (Recherches sur le mouvement d'un fluide pesant dans un plan vertical), H. Poncin. Publications Scientifiques et Techniques du Ministère de L'Air, No. 16, 1932, 102 pp., 16 figs.

MOTION of a perfect incompressible fluid in a vertical plane under the action of gravity is considered, and in the first part the simple case of motion having a geometric periodicity is discussed. In the second part, the general problem of continuous flow of a fluid under gravity with an indefinite curved boundary is taken up. Part III shows how the methods developed are applicable to problems relating to the motion of a fluid under gravity in a vertical plane where the field of the fluid is limited by two lines of flow the length of which may be either the sliding of the fluid under a solid boundary or under a fluid of the same nature at rest, or in contact with the atmosphere at constant pressure.

CORROSION PREVENTION

Electrochemical Oxidation and the Protection of Iron and Duralumin in Aërated Salt Solutions (Sur l'oxydation electrochimique la protection du fer et des duralumins dans les solutions salines aerees), E. Herzog and G. Chaudron. Publications Scientifiques et Techniques Du Ministere De L'Air, Service Des Recherches De L'Aéronautique. No. 19, 1933, 88 pp., 19 figs., 32 tables, 6 additional plates of microphotographs.

THE ACTION of a certain number of galvanic cells in function of the oxygen content of the salt solution serving as an electrolyte was investigated in this study of corrosion and methods for accelerating it. The first part of the research was undertaken to explain how the speed of the reaction of depolarization might be increased by the attack of oxygen under high pressures, by the addition of oxygenated water, or by alternate immersion and emersion of the test piece in the fluid. The authors describe an Evans cell for iron which they constructed and indicate the precautions necessary for its operation and charging, as well as the importance of the formation of the anode and the action of the cell in function of the oxygen content of the salt solution bathing the cathodic surface.

The last part of the report deals with the physico-chemical mechanism of corrosion of iron and duralumin in aërated salt solutions, and methods of protecting these metals against the action of aërated water. Mechanical tests of corroded metals and the different methods of attack are described, and the results of accelerated corrosion tests of iron and duralumin in aërated salt solutions are explained.

AIRPLANE LANDING GEAR

The Landing Gear of Airplanes (Les atterrisseurs d'avions), A. DeBoysson. L'Aeronautique, Vol. 15, No. 166, March, 1933 (L'Aerotechnique Section), pp. 17-23, 11 figs.

FUNCTIONS, designs and tests of landing gear for airplanes are discussed by a consulting engineer of the Charlestop Co. The author takes up various methods of absorbing the shock of landing and gives a numerical example of an airplane with a hydro-pneumatic type of shock absorber having a stroke of 150 mm. He recommends that the tread of the wheels should be as wide as possible and the stroke should be as long as possible and arranged so that part of the stroke will be an expansion stroke as the load descends. He believes the wheels should have as small tires as consistent with the static resistance and necessary bearing surface. He describes tests for finding the braking necessary in function of the sinking speed of the airplane.

A recent report of the Polish Institute of Aeronautical Research (Bulletin No. 10, 1932) contains an article entitled "The Load and Stability of Landing Gear," which indicates how the energy of the shock of landing may be determined as well as the reaction both with and without taking into account the work of the tires.

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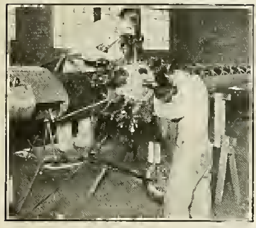

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BESLER STEAM POWER PLANT FOR AIRCRAFT

A. F. Bonnalie

STEAM AS POWER for aircraft has appealed to many since the days when the steam engine was first invented. Little was done, however, in applying steam to aircraft during the last thirty years until recently when Besler Systems, assisted by the Boeing School of Aeronautics, successfully flew a steam-driven airplane.

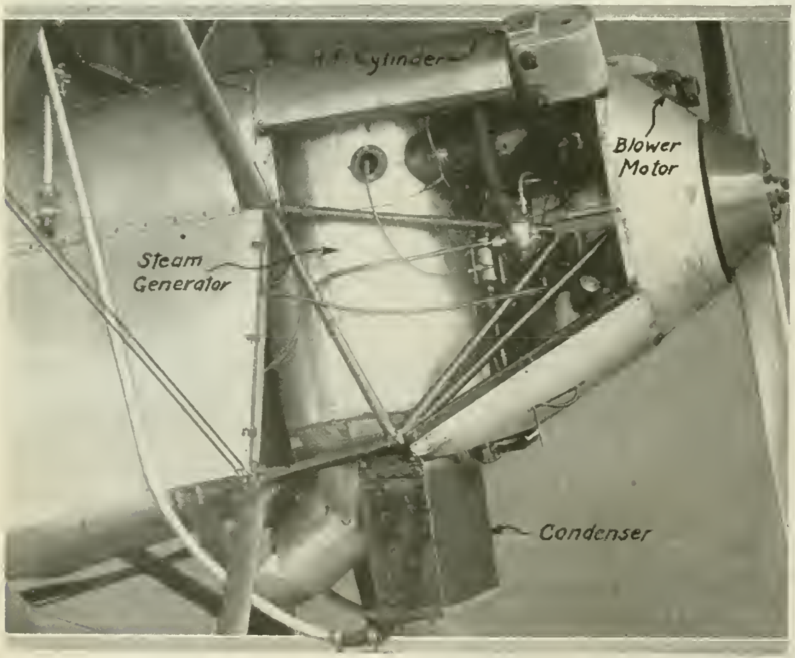
About 100 years ago Henson in England projected a large airplane with the idea of using steam as power. His estimates of power requirements were far short of the actual and as he was unable to promote the project, it failed to materialize. One of his consultants, Stringfellow, continued the work and flew a model airplane with a small steam power plant. In 1852 Giffard flew an airship propelled by a steam engine with some success. Maxim's experiments are well known as are the flights of the Langley steam-driven model airplane in 1896.

The rise of the internal combustion engine and its success in the Wright brothers' airplane of 1903 centered attention on gasoline engines of the internal combustion type and further experiments with steam power were dropped. The success of steam automobiles in the early days of automotive equipment demonstrated certain virtues but also revealed many shortcomings, particularly for relatively small plants. About 1915 Abner Doble's work with the steam automobile began to attract attention and shortly thereafter he announced his intention of attempting the development of a power plant for aircraft. Apparently nothing further was done for some years but the question was again discussed about 1925 and the potentialities estimated. It remained, however, for the Besler brothers of Emeryville, California, to actually bring the development to a practical point and on April 12, 1933, the first flight (so far as is known) by a steam-driven airplane, carrying a man, was made by William J. Besler at the Municipal Airport at Oakland, California.

The airplane was a Travel Air biplane originally built for a Curtiss OX-5 power plant. The power plant installation was developed entirely by Besler Systems and installed in place of the OX-5. There was found to be ample room and while considerable ingenuity was required, no difficulty was experienced in making the steam plant compact enough to fit into the available space. The steam plant, however, was heavier than the original power plant but it must not be overlooked that even the OX-5 engine represented more than a decade of development work in aircraft internal combustion power plants. It must also be appreciated that the potentialities for a satisfactory steam power plant are not nearly so good in the lower powers as they are in higher powers. In other words, when 1,000 or more horsepower is considered in a single unit, the external combustion type of power plant shows great promise. Furthermore, the installation as it now exists includes many parts that were taken from a Doble steam automobile. These parts are unnecessarily heavy and in some cases too large for the purpose. No attempt was made in this particular power plant to develop either extraordinary power or to make it extremely light. The immediate objective was to build a power plant capable of flight. Several years of laboratory work preceded the actual flight, during which period several engines and several steam generators were developed. When the power plant was finally installed in the Travel Air it had already run some 30 hours on the dynamometer and after installation in the fuselage it was operated for about 20 hours more. All of its characteristics were well known and flight was to all practical purposes a foregone conclusion. Furthermore, prior to dismantling the original power plant, the airplane was carefully weighed and measured by advanced students in the Boeing School of Aeronautics, the c.g. carefully located for all conditions of loading to insure that as close a comparison as possible could be obtained between the original OX-5 power plant and the new steam installation. When the airplane was re-erected it was checked to determine its conformity to the previous figures and the hub of the same propeller used with the OX-5 power plant was modified to fit the new steam engine. At the present writing quantitative flight tests have not been made but it is expected that interesting data will result therefrom.

The Besler brothers' steam engine is a two cylinder double-acting, compound, 90° Vee, with cross heads and auxiliary drive. A cut off of approximately 50% was adopted for this particular installation. The engine alone weighs about 180 lbs. but as the cross head guides and many other parts are of cast iron, the engine could be lightened considerably. The engine is also fitted with a reverse gear which allows the direction of rotation to be reversed in flight or at any time.

The steam generator is of continuous cold type fired by Diesel or furnace oil ignited electrically. An electrically-driven blower is fitted for starting purposes and the same blower is belt-driven from the engine for flight. The boiler is



Boeing School of Aeronautics photo

Installation of the Besler steam power plant in a Travel Air plane entirely automatically controlled, temperature being the major consideration. The total temperature of the steam is maintained at 750° F. by a device called a normalizer which injects water into the superheated steam in the main steam line, sufficient in quantity to maintain the desired temperature. The pressure fluctuates somewhat and a pop valve is fitted adjusted to 1800 lbs. per sq. in. pressure. The steam generator tube and superheater tube are continuous. The feed pump is a steam-driven, vertical type, somewhat similar to the heavy marine pattern. A primary and a secondary feed water heater are included, the latter being under the fuselage approximately below the pilot's seat.

Atmospheric type condensers were manufactured, the one fitted below the fuselage being made up from the core of a steam automobile condenser, a more efficient one being made from the old OX-5 radiator and mounted on top of the fuselage. The two condensers are connected by aluminum pipes down each side of the fuselage. The available condensing capacity is not sufficient to allow operation at full throttle without atmospheric exhaust and they are about 90% sufficient to take care of cruising throttle. A much more efficient condensing system could be developed and fitted somewhat along the lines of a tunnel type of radiator as used in liquid-cooled internal combustion engines. This would save appreciable weight and head resistance.

The first flights, while short, were extremely impressive. To fire up the boiler an external battery was used because of the low capacity of the battery fitted to the airplane. This external battery furnished the power to drive the blower and also to ignite the fuel. A few seconds after the fire was heard to come on normal steam pressure was available and the fire automatically shut off. The engine was then rotated slowly in the reverse direction to work the water out of the lines and after a few turns the valves were set for normal rotation and the engine was driven slowly for two or three minutes. It was then opened wide to test out the system.

From the time the fires were started until the engine was run up not more than five minutes elapsed. A little time was taken to further test out the reverse gear and to be sure that all apparatus was operating correctly; then the plane taxied down the field into position for takeoff. The takeoff was normal in every respect except that the absence of noise was most noticeable. In fact when the plane left the ground it was the observer's impression that the airplane was not getting up speed enough. It flew strongly, however, and circled back overhead a couple of times. When under full power no more noise was noticeable than is apparent with an airplane gliding in with a dead stick—merely the swish of the air could be heard. When operating on the ground at full throttle the propeller made but a little noise. The rumble of the fire could be heard above the propeller noise.

While the first flights were at low altitude, the climbing angle was noticeably steep and the airplane was obviously under full control of the pilot. As he approached for a landing and crossed the border of the field, the propeller rotation ceased and backward rotation slowly started as he threw the linkage into reverse and opened the throttle slightly. Even though the backward rotation was very slow, it noticeably steepened the approach. Immediately after touching the ground the pilot gave it full reverse throttle which, together with the brakes fitted to this particular airplane, brought it to a stop very quickly. This short run was particularly noticeable because there was no wind at the time and ordinarily the landing run would have been several hundred feet. Mr. Besler again took off and after a short straight-away flight, throttled back to a simulated forced landing, then took off once more and circled the field and landed again with a short run. Being satisfied with the preliminary tests the airplane was taxied in to await an opportunity to give more extensive demonstrations and to make quantitative tests.

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C.

Propeller. Gustav Lauszat, Milwaukee, Wis. (1,888,681)

Airplane. Walter R. Apperman, Fort Worth, Tex. (1,888,871)

Airplane construction. Giuseppe M. Bellanca, New Castle, Dela. (1,888,902)

Radio apparatus for assisting air and sea navigation. Oliver C. Warrick, Indianapolis, Ind. (1,889,026)

Safety parachute for airplanes. Milton J. Nouslakis, Bingham Canyon, Utah. (1,889,038)

Apparatus for plotting maps from air photographs. Archibald Barr, Anniesland, Glasgow, Scotland, assignor to Barr & Stroud, Ltd., Glasgow. (1,889,042)

Rotoplane. Joseph J. Leray, West Warwick, R. I. (1,889,255)

Triangular plane girder for airplanes. Celestino Rosatelli, Turin, Italy, assignor to Fiat Societa Anonima. (1,889,294)

Carburetor for aircraft engines for insuring regular engine working in inverted load conditions. Tranquillo Zerbi, Turin, Italy, assignor to Fiat Societa Anonima. (1,889,304)

Airfoil-carrying rack. Carlo Cohen-Venezian, Turin, Italy. (1,889,350)

Safety surface for airfoils. Samuel E. Hitt, Elyria, Ohio. (1,889,477)

Sound-wave apparatus. Chester W. Rice, Schenectady, N. Y., assignor to General Electric Co. (1,889,614)

Flying machine. Henry J. Turner, Forest Gate, England. (1,889,713)

Aircraft propeller. William F. Warfel, Wendling, Ore. (1,889,717)

Safety device for airplanes, and propeller, Alexander Alteri, Philadelphia, Pa. (1,889,766 and 1,889,767)

Device for preventing accumulation of ice on airplane propellers. William C. Geer, Ithaca, N. Y. (1,889,782)

Airplane. Albert A. Merrill, Jamaica, N. Y., assignor to Merrill Aircraft Co., Long Island City, N. Y. (1,889,864)

Airplane. Heralclio Alfaro, East Cleveland, Ohio. (1,890,012)

Flying boat. Ludwig A. Sanders, Voorburg, and Franz L. Stoot, The Hague, Netherlands. (1,890,021)

Airplane. Randolph F. Hall, Rochester, N. Y. (1,890,035)

Flying machine. Thomas A. Edison Lake, Milford, Conn. (1,890,059)

Airplane. Nicholas J. Medvedeff, Larchmont, N. Y. (1,890,064)

Multilens aerial camera. Ambrosius Briechle, Brooklyn; Frederick W. Lutz, Floral Park, and George Rattray, Mineola, N. Y., assignors to Fairchild Aerial Camera Corp., New York, N. Y. (1,890,074)

Aircraft wing. Henrich Focke, Bremen, Germany. (1,890,079)

Mail bag parachute. Charles M. Graeff, Harrisburg, Pa. (1,890,083)

Airplane propeller. Samuel E. Slonimsky, Sawtelle, Calif. (1,890,097)

Aeroship. Samuel E. Hitt, Elyria, Ohio. (1,890,113)

Automatic control system for airplanes. Young Ho Koun, New York, N. Y. (1,890,115)

Propeller. Ralph Klinger, Riverside, Calif. (1,890,120)

Elevator bomb rack for airplanes. Richard E. Bollam, Portland, Ore. (1,890,142)

Parachute attachment for airplanes. Louis R. Papp, Cleveland, O. (1,890,190)

Aircraft. Frederick C. Thomas, Cleveland, Ohio. (1,890,198)

Steering gear for water and air vehicles. Hermann Hort, Berlin-Neuwestend, Germany. (1,890,293)

Airplane. Earl Armour, Richmond, and John Kremer, St. Louis County, Mo. (1,890,354)

Automatic aerodynamic stabilizer for airplanes. Otto E. Bemberg, Paris, France. (1,890,363)

Helicoplane. Joseph J. Leray, West Warwick, R. I. ((1,890,519)

Airplane. Hugh H. Young, Baltimore, Md. (1,890,553)

Method of making hollow metal air screws. Marcel Pillard, Marseille, France. (1,890,747)

Airplane. Roscoe L. Markey, Nassau County, N. Y., assignor to Aviation Patent & Research Corp., New York, N. Y. (1,890,820)

Attachment for parachutes. Lewis E. Simpson and Charles H. Bartholomew, Wichita, Kans. (1,890,868)

Amphibion air vehicle. Donald W. Douglas, Santa Monica, Calif., assignor to Douglas Aircraft Co. (1,890,902)

Aircraft and method of flight and variable-pitch propeller. Emil A. Briner, East Orange, N. J. (1,890,931 and 1,890,932)

Parachute for illuminating flares. S. Wiley, Metuchen, N. J. (1,890,962)

Tilting engine wing plane. Mathias Leupold, Jamaica, N. Y. (1,891,166)

Airplane. Toichi N. K. Machi, Kamakura Gun, Japan. (1,891,170)

Parachute flare. Charles L. Paulus, Dayton, Ohio. (1,891,172)

Airplane landing gear. Arthur R. Stalb, Jr., Detroit, Mich. (1,891,188)

Aircraft control. Henry A. Meyer, St. Paul, Minn. (1,891,237)

Safety wing for airplanes. Charles H. Gunn, Burlingame, Calif. (1,891,261)

Airplane propeller. Samuel E. Slonimsky, Chelsea, Mass. (1,891,272)

Skimming aircraft landing sail. Herman Hein, Bremen, Germany. (1,891,309)

Airplane. Joseph J. Leray, West Warwick, R. I. (1,891,354)

Aircraft propeller. Joseph R. Gillis and Frank P. Kaiser, Lansing, Mich. (1,891,384)

Gull wing plane. James H. Kindelberger, West Los Angeles, Calif., assignor to Douglas Aircraft Co., Santa Monica, Calif. (1,891,385)

Aerial safety strap. Edward L. Hoffman, Dayton, Ohio. (1,891,418)

Internal combustion engine. Charles E. Schlenker, Lakewood, Ohio, assignor to Western Reserve Air Motors Corp. (1,891,453)

Means for releasing objects to be dropped from aircraft. Erich Deubel, Brooklyn, N. Y. (1,891,635)

Airplane. Peter Nachtsheim, New York, N. Y. (1,891,650)

Framework for wings of airplanes. George L. R. J. Messier, Montrouge, France. (1,891,812)

Flying machine. Willy Messerschmitt, Augsburg, Germany. (1,891,941)

Airplane strut construction. John H. Gould, Detroit, Mich., assignor to Aircraft Products Corp. (1,891,977)

Aircraft having sustaining rotors. Joseph S. Pecker, Philadelphia, Pa., assignor to Autogiro Co. (1,892,003)

Airplane landing ski. Roscoe I. Markey, Buffalo, N. Y., assignor to Aviation Patent & Research Corp., New York, N. Y. (1,892,004)

Means for controlling airplanes in flight. Bernhard Roberts, Aukland, New Zealand. (1,892,006)

Adjustable propeller. Thomas Burson and Charles W. Jenkins, Negley, Ohio. (1,892,035)

Helicopter. Denis R. Campens, Berchem-Antwerp, Belgium. (1,892,036)

Airplane engine mount. Roscoe I. Markey, assignor to Aviation Patent & Research Corp. (1,892,065)

Sound-absorbing monocoque fuselage. Roy G. Miller, Farmingdale, N. Y., assignor to Aviation Patent & Research Corp. (1,892,070)

Supercharging internal combustion engine. Frank Able, Inglewood, Calif. (1,892,124)

Atomizing attachment for airplane engine exhausts. John L. Berney, Modesto, Calif. (1,892,132)

Airplane spray device. John P. Desmet, Modesto, Calif. (1,892,139)

Variable- and reversible-pitch propeller. William M. Drennon, Anaheim, Calif. (1,892,187)

Airplane catapult. Edward E. Moe, Omaha, Neb. (1,892,357)

Airplane pick-up device. Henry G. Bushmeyer and Archie W. Card, Mineola, N. Y., assignor to Aero Pickup Service Corp. (1,892,381)

Landing and launching device for air vehicles. Oliver P. Gayman, Canal Winchester, Ohio. (1,892,460)

Float structure for land and sea planes. Vittorino Colonese, Rome, Italy. (1,892,746)

Airplane. Joseph Preatka, New York, N. Y. (1,892,808)

Aircraft. Howard Tebbs, Baltimore, Md. (1,892,910)

Machine gun mount for aircraft. Clem G. Trimbach, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,892,914)

Aircraft control surface adjusting mechanisms and aircraft controls. Arne F. Vinje, Freeport, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,892,915 and 1,892,916)

Collapsible fuselage for airplanes and the like. Frank V. Barzcy, Los Angeles, Calif. (1,892,925)

Control surface for aircraft. Raymond C. Blaylock, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,892,927)

Helicopter aircraft. Christopher C. Holmes, Los Angeles, Calif. (1,892,949)

Arrangement of engine on aircraft. Adolf Rohrbach, Berlin, Germany. (1,893,001)

Aircraft and control thereof. Edward F. Zaparka, New York, N. Y., assignor to Zap Development Co. (1,893,064 and 1,893,065)

Control system for ailerons. Lester N. Yohe, New Oxford, and Martin Jensen, Harrisburg, Pa. (1,893,118)

Airplane constituted by a three-element wing. Jean F. Charpentier, St. Cloud, France (1,893,129)

Vehicle for carrying aircraft parts and other loads. Carlo Cohen-Venezian, Turin, Italy. (1,893,227)

Bomb rack and control. Arthur S. Halsey, Washington, D. C. (1,893,232)

Airplane construction. William F. Deutscher, New York, N. Y. (1,893,275)

Airplane radio equipment. Charles F. Jenkins, Washington, D. C., assignor to C. Francis Jenkins, Inc. (1,893,287)

Device for stabilizing and controlling aircraft provided with rotatable wings of the helicopter type. Louis Breguet, Paris, France (1,893,395)

Apparatus for machining propeller blades and like articles. Llewellyn T. Pearce, Bristol, England, assignor to Bristol Aeroplane Co., Ltd. (1,893,443)

Airplane mooring method and apparatus. Carl B. Fritsche, Detroit, Mich., assignor to Aircraft Development Corp. (1,893,584)

Arresting hook for airplanes. Robert J. Minshall, Seattle, Wash., assignor to Boeing Airplane Co. (1,893,591)

Propeller. Frank W. Caldwell, Dayton, Ohio, assignor to Hamilton Standard Propeller Co. (1,893,612)

Airplane landing ski. William F. Kammer, Wenatchee, Wash. (1,893,647)

Airplane. Gustave W. Elmwell, New York, N. Y. (1,893,665)

Automatic parachute pack releaser. Mark W. Collet, Philadelphia, Pa. (1,893,818)

Propeller. Clinton B. Havill, South Orange, N. J., assignor to Bendix Research Corp., East Orange, N. J (1,893,861)

Flying boat. Adolf Rohrbach, Berlin, Germany (1,893,908)

Power means for aircraft. Andreas Eriksson, Chicago, Ill. (1,893,936)

Construction of fuselage or other bodies of aircraft. Barnes N. Wallis, Weybridge, England, assignor to Vickers (Aviation) Ltd. (1,894,011)

Aircraft signaling. John P. Buckley, Washington, D. C. (1,894,019)

Hydraulic propeller and variable-pitch propeller. Daniel G. Lilley, Denver, Colo. (1,894,047 and 1,894,048)

Aeronautic equipment. William Rahn, New York, N. Y., assignor to Rahn Aircraft Corp. (1,894,057)

Propeller. Charles E. Brooks, St. Louis County, Mo. (1,894,081)

Airship. Max Schirmer, Friedrichshafen, Bodensee, Germany, assignor to Luftschiffbau Zeppelin (1,894,245).

Airplane propeller. Glen T. Lampton, Pittsburgh, Pa. (1,894,276)

Aircraft with rotative sustaining blades or wings. Harold F. Pitcairn, Bryn Athyn, Pa., assignor to Autogiro Co. of America. (1,894,418)

STINSON MODEL SR "RELIANT"

THE NEW STINSON "RELIANT" for 1933 is a four-passenger high-wing monoplane of the closed-cabin type, powered with the Lycoming R-680 engine which develops 215 h. p. at 2000 r. p. m. Improvements in the engine include a heavy-duty crankshaft, stronger link rods, forged pistons and other detailed refinements.

The fuselage is of welded steel tubing, rounded and faired. Wings are of two-spar construction, externally braced by streamlined lift struts. Spars are of solid spruce braced by double steel drag rods and steel compression struts. Ribs are of stainless steel, electrically spot welded into a Warren truss.

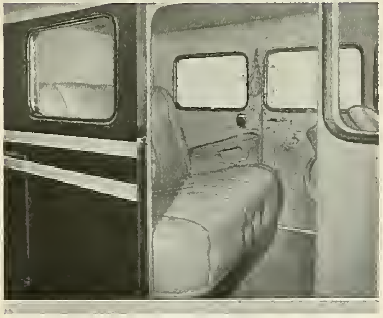
Lift struts are braced near the middle of their span by vertical auxiliary struts to the wing spars. These struts add greatly to the stiffness of the main struts. Ball bearings are used throughout the control system to reduce friction and wear, and plates and inspection openings are provided so that vital parts may be easily inspected.

The engine is attached by rubber shock-absorbing bushings, which help to deaden sound and reduce vibration. Considerable space is provided in the engine compartment forward of the firewall, making it easy to reach all engine parts for adjustment and check-up. This compartment houses the 12-volt storage battery used for lighting and starting. In this location, it is handy for service and it eliminates considerable wiring.

The new pursuit type landing gear is of the full cantilever type. Stubs extending from the fuselage serve as housings for Aerol air and oil type shock absorbers, as well as for the lift strut attachments. The stubs are faired and filleted, making a clean arrangement which reduces landing gear resistance. Each landing gear unit is built in one piece and contains only two bearings. The landing gear has also been widened and is equipped with semi air wheels, self-energizing brakes, tapered roller bearings and wheel fenders.

The fuselage, wings and tail surfaces are covered with fabric, and the exterior finish of the fuselage has a hand-rubbed polished surface. Harmonious colors, artistic striping in the Stinson design and bright chromium parts complete the exterior ensemble.

Seats have restful angles with soft roll cushions, deeply padded and tailored. Satin-finished hardware and map pockets with zippers are provided. Heaters and ventilators have been increased in capacity, and sound deadening has been accomplished to a greater degree than in previous models.



The Stinson's automobile-like interior

In the fore cabin a Y type column supports the throttle and dual-control wheels and is centrally mounted to allow a comfortable position for the pilot. The removal of four bolts disconnects the extra wheel, and two bolts disconnect the rudder pedals when single control is desired. An automobile type sloping footboard then covers the unused rudder pedals.

Both front seats may be adjusted fore and aft, as well as up and down, and it is possible to adjust the dual-control wheel to correspond with any position desired by the pilot. A delicate adjustment of the stabilizer is accomplished by turning a small handle overhead.

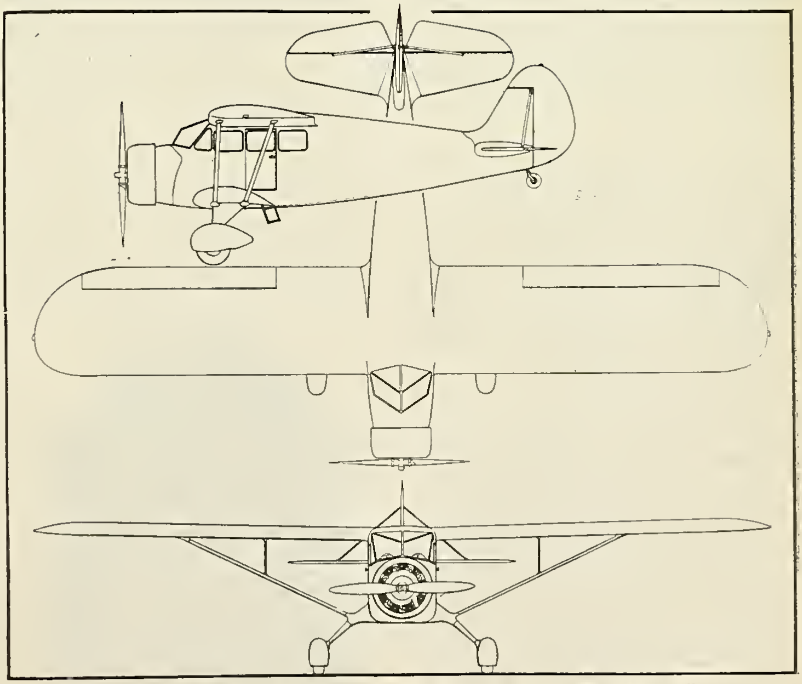
Non-glare safety glass is used in the vee-type windshield and clear safety glass in other windows. The instrument panel is provided with six standard flight and engine indicating instruments, indirectly lighted. On either side of the flight instruments the panel contains doors opening into a glove compartment and the fuse box. The electric starter button and emergency parking brake are located in convenient positions.

A baggage compartment opening from the outside is furnished with lock and key. Locks are also provided for the cabin doors.

The specifications and performances with full loads are as follows:

Specifications

Wing span	43 feet 3 inches
Length overall	27 feet
Height overall	8 feet 5 inches
Wing chord	75 inches
Dihedral	1.5 degrees
Wheel tread	10 feet
Wing area, including ailerons	235 square ft.
Aileron area	29.7 square feet
Stabilizer area	23.7 square feet
Elevator area	17.1 square feet
Fin area	7.63 square feet
Rudder area	12.21 square feet
Gross weight	3125 pounds
Weight empty	2040 pounds
Useful load	1085 pounds
Pay load	585 pounds
Weight of oil (4 gal.)	30 pounds
Weight of gasoline (50 gal.)	300 pounds
Baggage weight	75 pounds
Wing loading	13.3 lbs. per sq. ft.
Power loading	14.54 lbs. per h.p.
Rate of climb	750 feet per minute
Service ceiling	14,500 feet
Maximum ceiling	16,500 feet
Cruising speed	115 miles per hour
High speed	135 miles per hour
Landing run	250 feet



Three-view outline drawings of the Stinson Model SR "Reliant"

NEW EQUIPMENT and METHODS

MANLEY AIR COMPRESSORS

A NEW LINE of compressors has been announced by The Manley Manufacturing Co., York, Pa.

One of the chief features of these compressors is the centrifugal unloader. This device, in connection with the valve, completely unloads the cylinder when the air compressor stops. This allows the compressor to start again completely unloaded, thus protecting the motor.

The newly designed quiet valve construction, forced feed lubrication and counterbalanced crankshaft contribute materially to the efficiency of this compressor. The muffler eliminates moisture, and an exclusive tube feature in the muffler insures quiet running. The breather pipe is closed and connected to the crankcase, so that no dirt or dust can enter it.

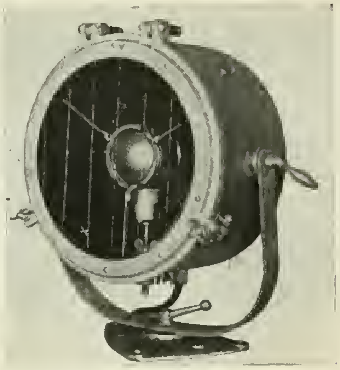
The cooling construction, with deep radiator fins in the cylinder and cylinder head, is another important feature. A large fan-type flywheel, perfectly balanced, insures a constant blast of air against the cylinder and helps to keep the compressor cool.

AIR ASSOCIATES MAGNETO SHIELDS

AIR ASSOCIATES magneto shields provide complete, effective radio shielding for any standard aircraft engine. They are furnished in sets, to fit the various engines, each set shielding one engine, and including shielded magneto distributor blocks for the two magnetos, shielded ignition wire leads and auxiliary shielding for the booster magneto and ground wire terminals on the magnetos. Shielded wire for connections to these terminals is extra.

The shields come assembled, ready to install. The shielded ignition wires are already connected to the shielded distributor blocks and are tagged with the cylinder number, and whether for front or rear plugs. These wires fit inside the regular wire manifold on the engine and fit either B. G. shielded spark plugs or Breeze spark plug shields. Shielded spark plugs or spark plug shields are not furnished with the sets.

Installation is simple. The old distributor blocks are removed from the magnetos and the old ignition wires are removed from the wire manifolds. The new shielded distributor blocks are slipped in place in the magnetos, and the new shielded wires are threaded through the wire manifolds and connected to the shielded spark plugs or spark plug shields. When the booster connection and ground wire connections are replaced with shielded wire the job is done. A shielded magneto switch also is usually installed to replace the old switch.



AIRPORT CEILING PROJECTOR

A CEILING PROJECTOR for determining the height of clouds at airports and weather bureau stations has been produced by the Westinghouse Electric and Manufacturing Co. The device is made of cast aluminum, supported by a heavy steel bow, and has a beam candlepower of over 3,000,000, using a 240-watt lamp. The optical system consists of a 16-inch commercial precision parabolic glass reflector, a precision glass secondary reflector and a ground and polished flat lens. A quadrant is mounted at the side of the unit for indicating all necessary angles of elevation.

This projector may be used with or without an alidade. When used with an alidade, it is set at an angle of elevation of 63° 26′ and the ceiling height is read directly on the alidade. If used without the alidade, it is set at an angle of 45°. The distance from the projector to the location directly beneath the spot on the ceiling is the same as the height of the ceiling.

NEW WESTPORT RADIO RECEIVER

THE WESTPORT Manufacturing Co., builders of aircraft radio apparatus, have expanded their field by introducing a new compact radio receiving apparatus for home, airport and office use.

Westport model GR8 radio receiver

The new set, Model GR8 Ground Station Receiver, covers all aviation channels. Model GR8 receives the day and night broadcasts of the airlines on a range from 30 to 200 meters, and all entertainment broadcasts from 200 to 550 meters. The U. S. Department of Commerce weather broadcasts and radio beam and beacon broadcasts are covered on a range of 750 to 1,500 meters.

The principal feature of the new Westport receiver is that it is possible to cover these several channels without the use of plug-in coils. A hand-matched burl walnut cabinet, measuring 9½ by 15¼ by 17¾ inches, houses the 8-tube superheterodyne cadmium plated chassis. The set, employing the new series "Dome Top" tubes, can be used on the 110-volt AC light line.

ENGINE TESTING INSTRUMENT

THE CROPLEY TESTSCOPE, manufactured by the Cropley Testscope Co. of Aurora, Ill., is designed to give quick and accurate engine tests, locating trouble in the ignition, compression and carburetion systems and insuring proper carburetor adjustment and spark timing. Testing coils, cables, spark plugs, valve condition and other parts in 28 tests, this instrument furnishes the desired information on an engine in fifteen minutes.

HYDROGEN-ELECTRIC WELDING

COPPER HYDROGEN-ELECTRIC WELDING, the automatic continuous welding process, welds without flame or arc and without apparent application of metal.

Hydrogen-Electric Welding is in no way comparable to gas-torch or electric arc welding; it produces a weld with entirely new and different characteristics. The parts to be welded are assembled by a snug fit, either by inserting one part into the other or by spot welding or pinning the parts together. Copper, either in the form of copper wire or copper paste,, is applied at the joint and the assemblies are loaded on to cars which are automatically elevated into the hydrogen-filled heating zone of the furnace. The hydrogen atmosphere completely reduces all oxides, scale, and other foreign matter on the surface of the parts and provides chemically clean surfaces for the welds.

In the heating zone the parts are gradually brought up to a maximum temperature of 2100° F., melting the copper which is drawn by capillary attraction both upwards and downwards into the seam. The iron and copper alloy together. Some of the copper goes into solid solution in the steel, and some of the iron is dissolved by the copper to produce an integral copper-iron alloy bond between the parts which are joined.

The Hydrogen-Welded parts are heated and cooled to practically room temperature in a reducing atmosphere, emerging from the furnace absolutely clean and free from scale or oxide. This is a particular advantage in the case of closed objects such as tanks, headers, floats, etc., which could not easily be cleaned after the welding operation.

This welding process at 2100° F. produces a dead-anneal, which relieves the parts from any strains that might have been set up by previous drawing, shearing, machining, etc. However, the condition may be corrected when desired by any of the usual heat-treating methods, without affecting the weld.

One of the salient points in connection with the process of Hydrogen-Electric-Welding enables welding on a quantity production basis. The furnace is capable of handling as many as a thousand pieces at one time. At normal operating speed the furnace discharges a car of welded parts every four minutes. It is capable of 24-hour-a-day operation.

An important advantage claimed for Hydrogen-Welding is economy. By this is meant not only economy of the process itself, but also savings in material and labor in producing the integral parts to be welded. Simple changes in design to adapt the product to the Hydrogen-Welding process often provide in addition better appearance, cleanliness, lighter weight, greater strength, and lower cost. No assemblies seem too intricate for this process, if the parts can be fitted together with good contact and there is a chance to apply copper in some form at or near the joint.

NEW GASOLINE PUMP HOSE

FOLLOWING A DEMAND for an efficient rubber covered gasoline pump hose, The B. F. Goodrich Rubber Company recently introduced such a new product, together with a new Permalock coupling specially designed for use on rubber covered pump hose. The Permalock coupling was designed to overcome leaking at the coupling. Features of the new hose are: same high quality metal lining used in regular hose, a special construction feature that prevents rubber from being forced down into convolutions of metal during braiding and wrapping and eliminates any possibility of rubber getting into the gasoline stream. Braid of heavy high quality yarn provides ample strength. The one inch size has a burst of approximately 1,000 pounds. A special tough, black rubber covers the cotton braid. Will resist abrasion and protect hose from wear against concrete island. New product will not discolor on hands of operator or rub off. Rubber cover can be cleaned easily by wiping with gasoline.

The Permalock coupling, as the name implies, is permanently locked into the hose. Although the new coupling cannot prevent leakage at the joints beyond the coupling, it is designed to prevent the gasoline from following down the coupling onto the cover of the hose.

The new hose is extremely flexible and retains the same flexibility during wet, cold weather, when ordinary hose becomes stiff and hard to handle.

AIRCRAFT BALL BEARINGS

A NEW SERIES of aircraft ball bearings has been put into production by the Fafnir Bearing Co. of New Britain, Conn. Bearings of this series, usable in a variety of control system applications, including control pulleys, are in accordance with the specifications recently established by the Army-Navy Standards Committee.

Known as the "K" series, four sizes are included—K3, K4, K6 and K8, the numerals denoting the number of sixteenths of an inch in the bore diameter. These bearings are the same type as previously supplied by this company, the chief difference in the "K" series being slightly wider bore tolerance; the two larger sizes are entirely new. The other characteristics of the "K" series, besides the extended inner ring, are double metal seals, cadmium plated rings, stainless steel side seals, full-type construction and complete pre-lubrication.

The advantages of ball bearing control pulleys involving this type bearing lie in the reduced pulley wobble, the elimination of lubrication and the less frequent replacement required. Fafnir ball bearings of the "K" series are designed to have ample static and fatigue capacities for the most vigorous pulley service and to be at the same time the most frictionless type of anti-friction bearings. Their high thrust capacity, due to the deep-groove construction, is especially valuable where pulley and cable are not perfectly aligned.

The Fafnir company also has introduced its new Aeroseal type of double metal seal aircraft bearings, designated as the "KC" series. Made in four sizes, the "KC" bearings parallel the Army and Navy standard "K" series so far as bore dimensions and general construction are concerned, but the "KC" bearings are lighter and more compact for each given bore size. They are equipped with metal seals, have extended inner rings and employ cadmium plate as a non-corrosive agent on external surfaces.

GOODYEAR HYDRAULIC BRAKE

A HYDRAULICALLY OPERATED brake has been developed for airplanes by the Goodyear Tire & Rubber Co., Akron, Ohio. The new brake, utilizing the metal disc clutch principle, is designed to fill every braking requirement of airplanes—smoothness, reserve power, non-fading and instantaneous release at all times. Approximately 97 per cent of the power applied reaches the brake unit, and the brake is not self-energizing. More braking surface is available, lower peripheral speeds are involved and greater areas of metal for heat distribution and dissipation. Because the brake unit is housed in the outside flange, the heat which is developed is completely isolated from the tire and tube, eliminating failures or flat tires due to heat.

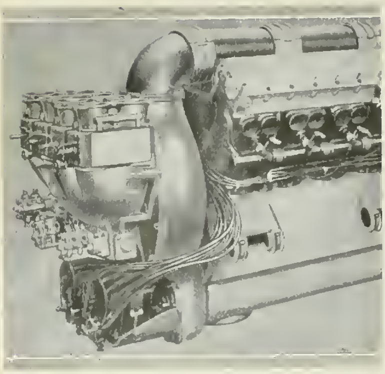
The brake is simple in construction. The bronze discs are keyed to engage and rotate with the wheel. The alternate steel discs are keyed on the anchor bracket or brake chassis and are non-rotating, so that as the oil pressure is applied through the master operating cylinder by means of the brake pedal, through the line and down to the brake itself, the brake piston moves and tends to press the rotating bronze discs against the non-rotating steel discs, creating controlled friction and resultant braking action. The diameter of the discs in the Goodyear brake is considerably smaller than that of the ordinary brake drum, so that peripheral speed is less. The Goodyear brake has 350 square inches of braking area, as compared with 72 square inches for the comparable size of band-type brake. The brake unit operates at an oil line pressure of approximately 150 pounds. Release of line pressure insures immediate release of brake.

Installation of the Goodyear brake is simple, aiding the manufacturer of planes in simplified design, construction and assembly. The new brakes can also be easily and quickly installed on ships that were originally equipped with mechanical brakes or band-type hydraulic brakes. From a maintenance standpoint, the only parts to be replaced on the brakes are the bronze discs, which can be changed in a few minutes.

SPRAY PAINTING GUN

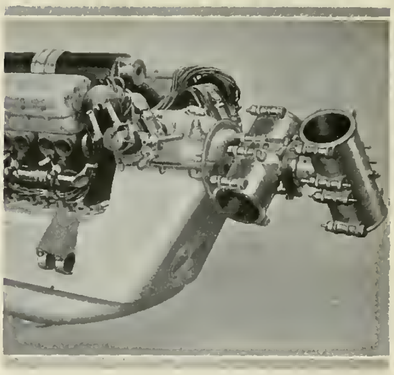
A GUN of simplified design for use in spray painting has been produced by the Eclipse Air Brush Co., Inc. Equipped with a variable trigger tension adjustment to be regulated to suit the operator, the gun is designed to have increased flexibility and a greater capacity for applying all types of coating materials. The device has an "out-in-the-clear" fluid plunger packing chamber, and regulation of the flow of the sprayed material is accomplished by a knurl-nut adjustment located at the "hammer position" on the gun. Width of spray also may be regulated by the operator.

The Eclipse G-6 air brush operates at low pressures and is designed to give even distribution of coating materials at all times. It employs the Eclipse fan-slot internal-mix nozzles. An assortment of extensions up to eight feet in length is available.



THE FIAT 2800 h.p. A.S.6 AERO ENGINE

Used in establishing the new world's speed record



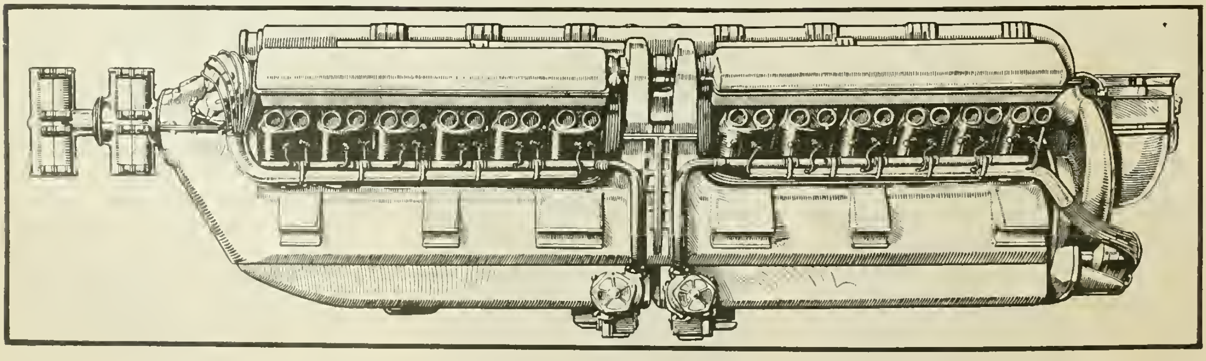
THE SUCCESSFUL culmination of repeated attempts on the part of the Italian Air Force to regain the world's speed record vindicated the sacrifices of men and money involved in this development when on April 10, 1933 at Desenzano, Italy, Warrant Officer Francesco Agello established a new official air speed record for seaplanes of 682.403 kilometers per hour (433.77 m.p.h.). The record was established with a Macchi-Fiat low-wing, wire-braced, twin-float seaplane of orthodox design except for the engine-propeller unit which embodies many interesting and novel features. The power plant of the record-making machine is the 24-cylinder Fiat A.S.6 water-cooled tandem type driving two tractor propellers rotating in opposite directions. There are two groups of 12 cylinders, both disposed in two rows set at 60 degrees, mounted on a single center bolted crankcase. These two groups are mechanically independent, having separate crankshafts and reduction gearing housed between the two units within the crankcase. The two reduction gear units drive independent propeller shafts located between the Vee of the front group of cylinders. One shaft runs inside the other, (which is a hollow sleeve shaft) terminating in two integrally-attached hubs for the adjustable-blade propellers. The Fiat Aircraft Engine Division may be justly proud of this latest product which is the result of many years of intensive development work. The 700 horsepower Fiat A.R.14, built in 1921, one of the first powerful water-cooled engines, began the long line of successful Fiat engines. Later developments of the Fiat line of racing engines were the A.S.2, which powered the winning Macchi seaplane in the Schneider Cup Races in the United States in 1926, the A.S.3, which in 1927 and 1928 brought to Italy the world's speed record, and, finally, the A.S.5, direct predecessor of the present A.S.6.

The novel arrangement adopted by Fiat engineers results in a minimum of frontal area for power developed, and steadiness and lack of vibration due to the fact that two crankshaft units move in opposite directions. As regards the operation of the propellers, it not only results in improved efficiency but also does away with the unfavorable gyroscopic and torque effects present when using a single propeller, thus contributing in a vital manner to the stability and ease of handling in the air and on the water.

The location of the propeller shafts made it necessary to adopt a method of induction manifold system different from the one customarily used on Vee-type engines. The method resorted to by Fiat consists of a compressor-impeller mounted at the rear end and drawing the mixture from a single eight-diffuser carburetor into a single lead tube set within the Vee and supplying the mixture to pairs of cylinders through individual feeds branching off from the main trunk. The ignition is assured by four 12 cylinder type M. F. 12 Marelli magnetos, two to each group of cylinders. Two of them are mounted on the rear and two others are mounted on the front half as shown in the accompanying illustrations. Spark advance is automatic. Mounted low and between the two groups of cylinders are two gear pumps to assure proper lubrication of the engine. Each of these gear pumps consists of one delivery and two scavenging elements.

Four centrifugal pumps circulate cooling water through the system. The starting is effected by means of a compressed air mixture distributed to the cylinders in their firing order by two engine-driven rotary distributors which are located high up on the engine. Initial firing is accomplished by means of hand-operated booster magneto. American-made Champion spark plugs were used in this engine when the recent flights were made.

The data available on the engine are rather meagre as naturally the development was done in secrecy but the following figures released seem reasonable considering the engine's unusual features: Weight dry, 2130 pounds. Maximum power developed, 2800 horsepower at 3000 revolutions per minute, giving an unusual weight-to-power ratio of about .98 pounds per horsepower. The rated power of the engine is 2500 horsepower.



Sketch showing side view of the Italian Fiat A.S.6 water-cooled racing engine of 2800 horsepower

• THE AIR SERVICES •

Army Field Combat Trials

A TOTAL of 113 airplanes, including a number of new fighting ships, will participate in field combat trials of the Army to be held at Fort Knox, Ky., May 15-27. Divided into "red" and "blue" factions, the Army will carry out maneuvers involving aeronautical and anti-aircraft tactics. Brigadier-General Julian R. Lindsey will command the "red" defensive forces, and Brigadier-General Harry C. Pratt of the Air Corps will be the head of the "blue" attack groups. Major-General George Van Horn Moseley will direct the maneuvers. Reserve officers from all sections of the United States have been invited to witness them.

The "blue" forces will operate principally against Fort Knox from Patterson Field, Ohio, 165 miles distant. Airplanes to be used will include twenty-three bombardment, twenty-one observation, eighteen attack, forty-five pursuit and six transport ships,. which will be chosen from fields throughout the country. Other participating groups will include three anti-aircraft coast artillery regiments; a signal company, troops of the Fifth Corps Area and reserve aviation units.

Chief objects of the maneuvers will be: Testing and development of equipment, technique and tactics of the Air Corps; development of technique and tactics of anti-aircraft artillery defense, with and without cooperation of pursuit aviation; investigation of the use of distant intelligence units cooperating with air units assigned to defense, and development of the employment of smoke in plane attacks on ground forces.

Selfridge Field Uses Rescue Plan

AN OPERATING MEMORANDUM recently issued by the 1st Pursuit Group Headquarters, Selfridge Field, Mich., revealed a new rescue system for use in case planes are forced down on Lake St. Clair. The system, which has been devised by Capt. R. G. Hoyt, group operations officer, under the direction of Maj. George H. Brett, the commanding officer, provides for ready location and quick relief for occupants of disabled planes on the water.

Maps of Lake St. Clair have been posted in the post operations office and the post boat house on the lake. These maps have been zoned by lines radiating from Selfridge Field and the zones named after some prominent landmark in each zone. In case of a forced landing in the lake, the pilot observing the position of the airplane will obtain the bearing of the line passing through Selfridge Field and the disabled aircraft. Upon landing, the reporting pilot will immediately determine the zone by referring to the map in post operations and report to the post operations officer, who will issue the appropriate orders for employing the amphibion rescue plane or the speedboat.

Air Corps in California Maneuvers

ABILITY of the Army Air Corps to mobilize and maintain itself under conditions approximating those of wartime will be determined in maneuvers to take place principally in Southern California some time this month. A total of 335 airplanes, 390 officers and 1822 enlisted men are expected to participate.

Details concerning the maneuvers are being kept secret, even from commanding officers of the air groups involved, in order that conditions resembling an emergency may prevail. Not even the time of departure from home bases or the route to be followed are known. Only some Army officers who are members of the staff in Washington and the various corps area commanders will have advance knowledge of these details. Financing of the maneuvers will be secured from regular funds for Air Corps training, it is reported.

Navy Uses Propeller-Balancing Method

THE NAVAL AIR STATION at San Diego, Calif., has put into practice a new method of obtaining horizontal balance of propellers without repeated disassemblies and trials with molten lead. Before assembly the depth of the balancing holes is noted in each blade, and on the balancing stand the proper amount of lead wool is placed on the top of the hub over the bottom of the center balancing hole of one blade to obtain perfect balance. The propeller is then disassembled and the lead wool placed in the blade and hammered with a punch sufficiently to make it amalgamate with the lead already there. If the above operation is carefully done, it will eliminate repeated operations of leading the blades to obtain perfect balance, or severe dressing of the blades.

World Airlines Shown on Naval Map

THE NAVAL HYDROGRAPHIC OFFICE has published a map showing "The Main Trunk Air Routes of the World," with the April issue of the Pilot Chart of the Upper Air. The map shows the established airlines in various parts of the world and projected routes across the Atlantic and Pacific Oceans, which follow in general the pioneer flights of Alcott, Lindbergh, Eckener, Kingsford-Smith and others.

The map gives a comprehensive view of the strides aviation is making and the numerous aerial transport lines which have been established between geographic points regardless of seas, jungles or desert. The established routes, some of which are seasonal, are indicated on the map by continuous lines, while projected airlines are shown by series of dashes. Approximate courses between points are indicated, and distances between connected points, computed in nautical miles, are printed on the map.

British Air Attachés Feted

A LUNCHEON was given last month by foreign and military air attachés in Washington, D. C., in honor of Group Capt. L. J. Fiennes and Group Capt. G. R. MacF. Reid. Captain Fiennes is the retiring air attaché of the British embassy, and Captain Reid is his successor.

Naval Flying Hours Cut

SECRETARY OF THE NAVY Claude A. Swanson recently issued an order reducing to 100 the number of flying hours required annually of Naval aviation officers as qualification for flying pay. The former requirement was 120 flying hours a year.

Naval Reserves Make Portable Starter

THE NAVAL RESERVE STATION at Squantum, Mass., has contrived a practical pneumatic power starter by fitting an adapter to a small air drill and by making an old air compressor into a portable unit. It has been found to be useful where weather is cold and personnel limited.

Acme photo

U. S. Navy Douglas amphibion especially fitted up for President Roosevelt

Air Transport Squadron Formed

PURSUANT to instructions received from the Chief of the Army Air Corps Materiel Division, the 2nd Provisional Air Transport Squadron has been constituted at the San Antonio Air Depot, Duncan Field, Tex., with the station operations officer as the commanding officer and operations officer, the remainder of its personnel to be such enlisted pilots as may be assigned to the depot for general transport duty. This is one of the provisional squadrons constituted at each of the continental air depots as a part of the First Provisional Air Transport Group, to be considered as a provisional and embryonic organization, under the new Air Corps policy looking to the establishment of such a group with the basic function of supplying tactical organizations in the field, and the further function of transporting supplies from the depots to stations in the control areas.

Equipment Branch Head Transferred

THE TRANSFER of Maj. F. H. Coleman to Patterson Field as commanding officer left the Equipment Branch of the Army Air Corps Materiel Division without a chief. Maj. E. L. Hoffman succeeds Major Coleman as acting chief of the Equipment Branch. Major Hoffman has been associated with the Equipment Branch for many years as chief of the parachute unit and is acknowledged as one of the foremost parachute authorities in the world.

Wallace Beery Joins the Air Reserves

WALLACE BEERY, moving picture actor, was commissioned a lieutenant-commander in the Naval Reserve Aviation Corps last month. He will be attached to the Naval reserve aviation base at Long Beach, Calif.

Sunnyvale Naval Station Is Dedicated

THE NAVAL AIR STATION at Sunnyvale, Calif., was placed in commission April 12 under Comdr. Myron J. Walker, executive officer, during the absence at Lakehurst, N. J., of Capt. Harry E. Shoemaker, commanding officer. The station, which will be the home of the U. S. S. *Macon*, will be the most modern and completely equipped airship base in the world, and by its central location on the Pacific Coast and the favorable climatic conditions in the vicinity will permit the full utilization of the *Macon* as an effective arm of the Fleet.

The Sunnyvale station occupies a tract of 1,000 acres situated near the southern end of San Francisco Bay, which was selected by a Naval board headed by the late Rear Admiral Moffett. The base is about eighty per cent complete and is ready to receive the *Macon* when she goes to the West Coast after her trials and acceptance by the Navy. When completed, the station will represent an investment of about $4,500,000 and will be one of the most complete and efficient possessed by the Navy.

Aleutian Stations to Be Founded

THE BERING SEA AEROLOGICAL EXPEDITION under the command of Lieut.-Comdr. W. M. Lockhart, U. S. N., has left Seattle, Wash., for the Aleutian Islands area, where aerological stations will be established at three locations.

Marine Reserves Organize at Oakland

OBSERVATION SQUADRON 10, Marine Corps Reserve, has been organized at the Naval Air Reserve Base, Oakland Municipal Airport, Calif. At present it has nine commissioned pilots and fifty-three enlisted men recruited from the bay area. Hell Divers, Martin bombers and trainers are available as flying equipment. The enlisted men are instructed as airplane mechanics, engine mechanics, machine gunners, radio operators, and in administrative details. The Marine Corps has detailed one lieutenant and one staff sergeant for duty as instructor and inspector respectively.

Airplane Landing Aid Tested

A NEW PLAN for use in landing airplanes was tested recently, when the Universal battery converter, which operates from six volts, giving 110-volt alternating current output, was used during the Hawaiian maneuvers of the aircraft carrier *Lexington*. The converter made by the Universal Microphone Co. of Inglewood, Calif., was used to operate a neon and tube signalling device to direct pilots landing their craft on the deck of the *Lexington*.

The Universal converter and neon tube carried correct and visible signals during night flying, dense fog and other poor weather conditions. This made it possible to run quickly from one spot to another with the needed signals and make the entire landing in a short space of time. Signals were in code formation, and the equipment made a compact, light-weight and serviceable aid. The battery converter has been passed by the Naval engineering board and is now also in use at the North Island Naval Base in San Diego, Calif.

U. S. S. Macon on Maiden Flight

UNDER THE COMMAND of Lt.-Comdr. Alger H. Dresel, U. S. N., the U. S. S. *Macon* made its first flight on April 21. The first of its shakedown cruises occupied more than twelve hours and covered areas in the vicinity of northern Ohio and Lake Erie.

On board the *Macon* were 105 passengers, consisting of the crew, Rear Admiral George C. Day and his naval board of inspection, Dr. Karl Arnstein and other Goodyear-Zeppelin Corp. officials, technical engineers and inspectors.

The complete schedule of tests to be conducted for the purpose of determining whether the Navy will pronounce the *Macon* as fulfilling the contract requirements will include a total of six flights aggregating about 84 hours.

30 Planes in Pacific Flight

THIRTY ARMY PATROL planes from the Naval Air Station at Pearl Harbor completed a 500-mile flight from the island of Oahu to French Frigate Shoals, April 20. The flight was made in six hours. Comdr. E. W. Todd directed the flight in which thirty commissioned officers and 100 enlisted men participated.

The planes, thirty in number, consisted of three squadrons of twin-motored Douglas and Keystone flying boats. The formation flight was part of the training operations being conducted in the vicinity of French Frigate Shoals until April 29.

King Succeeds Moffett

CAPTAIN Ernest J. King, U. S. N., who has been nominated by the President as Chief of the Bureau of Aeronautics, Navy Department, is now under instruction at the Navy War College, Newport, R. I. He was promoted to Rear Admiral December 11, 1932.

Captain King was born in Lorain, Ohio, November 23, 1878, and was appointed to the Naval Academy in 1897.

In 1919 Captain King served as head of the Post Graduate Department, Naval Academy, Annapolis, and in 1921 was ordered to command the U. S. S. *Bridge*, supply ship. In 1923 he was transferred to command the U. S. S. *Chewink*, submarine tender, the Submarine Base, and the submarines based at New London, and Inspector of Ordnance in Charge of the Navy Mine Depot, New London. In 1927 he qualified as a naval aviator. He commanded the U. S. S. *Wright* during 1926 and 1927, and on April 13, 1928, was appointed Commander, Aircraft Squadrons, Scouting Fleet. In August, 1928, he was transferred to duty as Assistant Chief of the Bureau of Aeronautics, Navy Department, and in April 11, 1929, commanded the Naval Air Station, Hampton Roads, Va. He assumed command of the U. S. S. *Lexington*, aircraft carrier, May 10, 1930, and reported at the Naval War College on June 30, 1932.

Captain King was in charge of the salvage operations of the submarine *S-51*, which was sunk off Block Island in September, 1925, and for that service was awarded the Distinguished Service Medal. When the submarine *S-4* was sunk off Provincetown, Mass., in 1927, Captain King was placed in charge of the salvage operations.

AERONAUTICAL INDUSTRY

Aviation Corporation Shows Profit

L. B. MANNING, new president of the manufacturing and transport divisions of the Aviation Corp. reports a profit for March of $14,805, the first monthly profit recorded by that corporation. Mr. Manning attributes the improved condition to E. L. Cord and his associates' drive for "strict economy, better flying equipment and methods, together with elimination of market losses."

Although March showed a profit, the net loss for the first quarter amounted to $57,408. The latter figure, however, showed a decided betterment of the company's business trend over the first quarter of 1932, when the corporation showed a loss of nearly a million dollars.

American Airways, another of the Cord-controlled Aviation Corp. subsidiaries, reported a 45% increase in passenger traffic for the first quarter of 1933 as compared with the same period a year ago. Air express poundage showed a corresponding increase of three times its volume for the first three months of 1932.

Aviation Manager for Postal

E. J. LANAGAN is appointed Aviation Manager for the Metropolitan Division with headquarters at 67 Broad Street. Mr. Lanagan's efforts will be devoted exclusively to the development of air ticket and air express business. His past experiences in branch office work and headquarters assignments, as well as aviation work, give him a good understanding of the problems in the development of this phase of the business.

Air Race Program Announced

CLIFFORD W. HENDERSON, manager, and Phil Henderson, assistant manager of the 1933 National Air Races, to be held at Los Angeles Municipal Airport, July 1 to 4, have announced their schedule of events.

On July 1 there will be, in addition to three free-for-all events, the Bendix Trophy Race and the Shell speed dashes for men and for women. July 2 will feature the Aerol Trophy Race for women, and four free-for-all races. On July 3, there will be four free-for-all events and the second Shell speed dash for men pilots. On Independence Day, the last day of the meet, there will be three free-for-all sweepstakes finals for three different classifications of planes, and the Thompson Trophy Race. Each day of the Races there will be a parachute jumping contest for cash prizes.

The military and naval air forces of the United States will participate in each day's program with maneuvers and formation flights.

The free-for-all events are open to planes powered with engines classed as having a piston-displacement of 200, 375, 550 and 1000 cubic inches. The sweepstake awards will be made to those pilots amassing the greatest number of points in the particular classes in which their planes are entered, and who have flown the same ship in each of the four qualifying events.

A noticeable change in the nature of the events is the likelihood that all entrants will be high-speed, specially built racing planes. The shorter length of time allotted to the races has necessitated the omission of events formerly restricted to standard A. T. C. models. This move is deliberate on the part of the management, whose belief it is that the public, by now familiar with standard models, will be more interested in speedy, specially designed racing craft.

Entries for the National Air Races will be accepted up to and including June 1, 1933.

COMING AERONAUTICAL EVENTS

May 7. Sportsman pilot air meet at College Park, Md., under the auspices of the Washington Air Derby Association, Inc., in co-operation with the Greater National Capital Committee.

May 7. Third annual air circus of the American Legion at Bakersfield, Cal.

May 14. Dedication of administration building at Salt Lake City, Utah, airport.

May 15-27. Army Air Corps field trials at Fort Knox, Ky.

May 16-22. International aeronautic rally at Vienna, Austria.

May 19-21. Used airplane show at Bettis Airport, Pittsburgh, Pa.

May 25. Aeronautical tourist meet at Wiesbaden, Germany.

May 28. First annual race for the Deutsche de la Meurthe Cup at Etampes, France.

Latter part of May—New England soaring meet at Deerfield, Mass.

May 30. Air races at the Parker D. Cramer Airport, Clarion, Pa.

May 30. Ninety-Nines invitation all-women's race from Floyd Bennett Field, Brooklyn, N. Y., to Valley Stream, L. I., N. Y., and return.

May and June. German Air Sport Exhibition at Stuttgart, Germany.

June. Sectional charity air meet at Atlanta, Ga., under the auspices of the Amateur Air Pilots' Association.

June. Sectional charity air meet at Springfield, Mass., under the auspices of the Amateur Air Pilots' Association.

June 1-November 1. Aeronautical Exhibit at A Century of Progress Exposition, Chicago, Ill.

June 10 (tentative). The 1933 Montreal (Quebec) Air Races.

June 11. International aeronautic meet at Brussels, Belgium.

June 11. International airplane contest at Angers, France.

June 12-July 10. Soaring camp at Elmira, N. Y., under the auspices of The Soaring Society of America, Inc.

June 15-18. Air touring festival, under the auspices of the Aero Club of France.

June 26-30. Annual meeting of the American Society for Testing Materials at The Stevens, Chicago, Ill.

July. German Air Sport Exhibition at Munich, Germany.

July 1-4. National Air Races of 1933 at Los Angeles, Calif.

July 1-4. International air meet at Chicago, Ill., under the auspices of American Air Race Association.

July 3 (tentative). National meeting of the Ninety-Nines at Los Angeles, Calif.

July 4. Dedication of American Legion Dale Jackson Airport, Faribault, Minn.

July 4. Dedication of the Norfolk-Tidewater Airport at Norfolk, Va.

July 10-23. Fourth Annual National Soaring Contest at Elmira, N. Y.

July 15. International aeronautic rally at Dieppe, France.

July 15-16. Air race meet at Detroit, Mich., planned in connection with the Michigan Air Tour.

July 22-24. International aeronautic rally on the Belgian coast.

August. German Air Sport Exhibition at Hamburg, Germany.

August 30-October 3. Gliding competition at Banne d'Ordanche, France.

September 1-4. International air meet and Gordon Bennett Balloon Race at Chicago, Ill., in connection with A Century of Progress Exposition.

September 9-10. Dedication anniversary program, including air races and aerial demonstrations, at Indianapolis (Ind.) Municipal Airport.

September 30-Oct. 8 (tentative). American Legion air meet at Chicago, Ill.

Oct. 7-8. National charity air pageant, under the auspices of the Judson Health Center, the Emergency Exchange Association and the U. S. Amateur Air Pilots' Association, at Roosevelt Field, L. I., N. Y.

November. German Air Sport Exhibition at Hanover, Germany.

December. International aeronautic rally at Cairo, Egypt.

Gasoline Tax ill Defeated

A BILL proposing that a fund for improving and maintaining existing Oklahoma airports be created from money collected by taxing airplane gasoline was removed from the Oklahoma house revenue and taxation committee.

Guy Miller Now Sales Manager

GUY MILLER, formerly test pilot of the Kellett Autogiro Corporation, has been appointed sales manager for Pitcairn Aeronautical Corporation, distributors of Pitcairn Autogiros in Philadelphia and Eastern Pennsylvania.

New Kinner Appointee

VERMILYA-HUFFMAN Flying Service, Lunken Airport, Cincinnati, has been appointed Kinner aircraft dealer. A Kinner "Sportster" for demonstrating purposes has been delivered to them.

All-Women's Annual Air Race

UNDER THE SPONSORSHIP of Mrs. I. J. Fox, the Second Annual "Annette Gipson All-Women's Air Race" will be held, May 30th, at Floyd Bennett Field, Brooklyn, New York. The purpose of the contest is to stimulate aviation from women's standpoint, and to afford girl fliers an opportunity for contesting in an event some months ahead of the National Air Races at Los Angeles.

It is not a commercial enterprise; there will be no entrance fee to contestants, nor will admission be charged the public. Cash prizes aggregating eight hundred and fifty dollars will be awarded, and the event will be conducted under rules of the F. A. I.

Amelia Earhart (Putnam) has consented to act as official starter and other women prominent in aviation have expressed their desire to cooperate.

1,046,983 Passengers Carried in Six Months

CIVIL AIRCRAFT of the United States carried 1,046,983 passengers during the six months ended December 31, according to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Of these, 291,727 rode on scheduled air lines and 755,256 were carried by miscellaneous operators.

The number of miles flown by all civil aircraft, including both passenger and non-passenger flights, was 70,720,568.

In the last half of 1931 the passengers carried in civil aeronautics totalled 1,384,621, and miles flown, 78,255,582.

Menasco Motors Reorganization

THE ASSETS of the Menasco Motors, Inc. have been purchased by a new syndicate of Western business men interested in aviation development. The new group is headed by Douglas G. Shearer of Los Angeles.

A new corporation is being formed to be known as the Menasco Manufacturing Company. New equipment is being acquired to bring the factory up to full equipment status. The old management and personnel, headed by A. S. Menasco, is being retained, and improvements are being incorporated into the Pirate and Buccaneer series of engines which the company has been producing for the past four years. A new and larger horsepower engine will be added to the present line shortly. It is understood that the new group have an important foreign government interested in the new engine.

The engines have been an important factor in air race competition for the past three years, and it is expected that numerous new Menasco-powered ships will make their appearance at this year's National Air Races, to be held in Los Angeles, where the factory is located.

Foreign Air Mail Service

SEALED PROPOSALS will be received at the Office of the Second Assistant Postmaster General until 12 o'clock noon May 24, 1933 for carrying mails by air for a term of four years beginning July 1, 1933 (or such subsequent date as may be ordered by the Postmaster General) on the following route:

From Seattle, Washington, to Victoria, British Columbia, and return, as well as from Quarantine, Vancouver Island, when necessary on return flights, on a schedule satisfactory to the Postmaster General, in close connection at Victoria with outgoing and incoming trans-Pacific mail steamers. The present requirement is about twelve round trips a month.

Detailed information on the subject may be obtained upon request to the Second Assistant Postmaster General, Division of International Postal Service, Post Office Dept., Washington, D. C.

DIGEST OF RECENT EVENTS

Flies and Lands Blind

JAMES L. KINNEY, Department of Commerce pilot, made three blind landings and one take-off at Newark (N. J.) Airport, aided by the recently installed radio landing beacon. He was accompanied on the flights by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. (March 31.)

Mount Everest Expedition Successful

THE MARQUESS of Douglas and Clydesdale, accompanied by Col. L. V. S. Blacker, in a Houston-Westland, powered with a Pegasus I engine, and Flight Lieut. D. F. McIntyre with S. R. Bonnett, veteran cameraman, in a Westland-Wallace, powered with Bristol-Pegasus, completed a flight over Mount Everest, highest peak of the Himalayas. The following day Mount Kanchenjunga, second highest of the range and nearly as inaccessible, was crossed by the expedition. (April 3-4.)

Airships Wrecked

THE U.S.S. *AKRON* went down at sea off the New Jersey coast, during a severe storm. Only one officer and two of her crew were rescued. The nonrigid airship J-3, from the Lakehurst Naval Air Station, was forced to the water during an attempt at rescue work; one officer and one member of the crew were lost. (April 4.)

Italians Set Seaplane Speed Records

WARRANT OFFICER Francisco Agello of the Italian Navy set an officially recognized world's speed record of 423.772 m.p.h. in a Fiat-powered Macchi-Castoldi 72, over Lake Garda. Later in the month an unofficial record of 434 m.p.h. was claimed by Col. Mario Bernasconi, member of the Italian Schneider Cup team, in the same plane. (April 10 and 24.)

Madrid-to-Manila Flight Completed

A SOLO FLIGHT from Spain to the Philippines was completed by Fernando Rein Loring. He took off from Madrid on March 18. He is the first flier to make the crossing from Hong Kong to Manila (730 mi.) unaccompanied. (April 10.)

Steam-Powered Plane is Flown

A TRAVEL AIR airplane, powered with a steam engine designed by George D. and William J. Besler, made three successful test flights from Oakland (Cal.) Municipal Airport. (April 12.)

French Girl Completes Long Flight

MARYSE HILTZE, well-known French flier, completed a flight from Paris to Tokyo, via Bassorah, Jodhpur, Calcutta, Rangoon, and Hanoi. (April 16.)

Macon Takes to Air

THE NEW military airship U. S. S. *Macon* constructed by the Goodyear-Zeppelin Corporation cruised for about thirteen hours on her maiden voyage from the hangar at Akron, Ohio. She was commanded by Capt. Alger H. Dresel, and carried a total of 105 passengers and crew. Officers and Naval inspectors expressed satisfaction with her performance. (April 21.)

Lakehurst May Be Abandoned

ADMIRAL WM. V. PRATT announced the projected abandonment of the Naval Air Station at Lakehurst, N. J., as a measure of Naval economy. (April 25.)

R. C. Muir Appointed Manager of Engineering for General Electric

THE APPOINTMENT of Roy C. Muir, for three years assistant to the late Charles E. Eveleth, vice president in charge of engineering, as manager of the engineering department of the General Electric Company, has been announced by President Gerard Swope. In his new capacity, Mr. Muir will have direct charge of the company's design engineering in all of its various plants, the works laboratories, and the general engineering laboratory at Schenectady. He has been associated with the General Electric Company for 28 years, and his engineering experience covers a wide range of applications and developments, including three years as chief commercial engineer of the International General Electric Company.

Miss Hester Opens School

DOROTHY HESTER, well-known woman acrobatic flyer, has opened a flying school of her own on Swan Island airport, Portland, Ore. She plans to cater particularly to women. Nine students have been enrolled for her instruction which will be based on the Rankin system of flying which is now in use in some 65 aviation schools. Tex Rankin will be associated with the school in an advisory capacity.

Aviation Corp. Director Chosen

W. H. BEAL, president of Auburn Automobile Co., was elected a director of the Aviation Corp. of Delaware, at the annual stockholders' meeting last month. Mr. Beal succeeds Amon G. Carter, publisher, of Fort Worth, Texas, who resigned.

New York offices of the Aviation Corp. have been moved to 45 Vanderbilt Avenue.

Air Meet Planned for Detroit

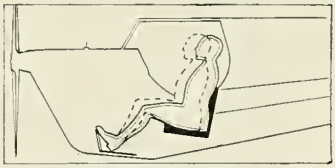
DETROIT, MICH., will hold its first air race meet in several years, July 15-16, according to present plans. Prizes amounting to $10,000 in cash will be offered in closed-course races, and efforts to tie up with the Michigan Air Tour, which is not yet definitely scheduled, are to be made. The race meet was first suggested by those interested in the Wayne County Airport. Since then several civic organizations, including the Tourist and Convention Bureau, have organized behind the move.

Aeronautical Oil And Gas Consumption

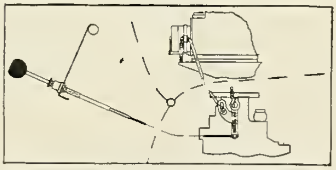
CIVIL AND GOVERNMENT aircraft in the United States consumed 54,058,431 gallons of gasoline and 1,568,928 gallons of oil in 1932, according to reports received by the Aeronautics Branch of the Department of Commerce, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, announced.

(*Continued on following page*)

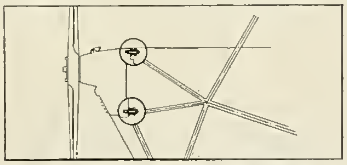
~ with the improvements you've asked for ~ plus a few of our own...



The deeper, longer seat gives greater comfort, more leg room and more space for pilot and passenger. The deeply upholstered seat-cushion can be removed when parachutes are used.



The automatic spark control is connected directly to the throttle, resulting in slower idling and longer motor life due to the smoother flow of power-impulses when throttle is used quickly.



The new motor mount eliminates all direct metal-to-metal contact between plane and motor. There is no noticeable vibration of any kind because all is absorbed by the rubber mountings.

The Aeronca Collegian has been nationally accepted as the best light plane in the world. It pioneered its field and its overwhelming popularity is the best evidence of undisputed leadership. Private owners are enthusiastic over its performance, safety and reliability. Operators are convinced that no other plane will even approach its earning powers as a student-trainer. The consistently high price of used Aeroncas is positive proof of these statements.

But we never rest. We listened carefully to all the hearty compliments . . . and made careful notations of occasional criticisms. We flew our ships ourselves . . . in a half-dozen factory-owned schools and over thousands of miles cross-country. We tried to find fault . . . were looking for it . . . so that we could better and improve . . . and show you an Aeronca that every one would consider perfect. The new Aeronca *is* that perfect!

The colors are sparkling vermillion and jet black. The curve at the seat is more graceful and somewhat higher; the seat is deeper, softer and longer . . . giving much more room; the right-hand rudder pedals are quickly removable; the spark control is now automatic with the throttle; the new Flottorp propeller has stainless steel edges and tips and cruises the ship faster; the Goodrich airwheels have Zerk fittings; the tail skid is redesigned and much stronger; the crash pad is neater and extends over the entire width of the cockpit; the motor is mounted in rubber and practically vibrationless.

Add these improvements to the 1500 hour reliability, the foolproof stability, the contest-winning maneuverability and the 2½ gal. per hour economy of operation and you have a ship which every private owner prospect or aircraft operator should investigate before he buys anything. Write for booklet giving complete information about the Aeronca for business or pleasure.

AERONAUTICAL CORPORATION OF AMERICA
Lunken Airport Cincinnati, Ohio

(*Continued from preceding page*)

Aircraft flying in civil operations used 33,980,547 gallons of gasoline and 1,113,165 gallons of oil. Of these amounts scheduled air transport services consumed 23,686,948 gallons of gasoline and 702,021 gallons of oil. For aircraft operating in miscellaneous flying, the consumption amounted to 10,293,599 gallons of gasoline and 411,144 gallons of oil.

Government aircraft, which include those used by the Army Air Corps, Naval Bureau of Aeronautics, the United States Coast Guard and the Aeronautics Branch of the Department of Commerce, consumed 20,077,884 gallons of gasoline and 455,763 gallons of oil.

Haskelite Moves Office

THE HASKELITE Manufacturing Corp. of Chicago has moved its executive offices to 208 Washington St., Chicago.

The Doolittles on a World Tour

MAJ. JAMES A. DOOLITTLE, speed pilot, and Mrs. Doolittle sailed recently from the Pacific Coast on a business and pleasure trip of four months around the world. They will fly a large part of the distance in planes of the Royal Dutch Air Lines and the Imperial Airways.

Balchen Sails for Antarctic Flight

BERNT BALCHEN left New York last month for Norway as the first step in the expedition to the Antarctic he is to make with Lincoln Ellsworth and others. Mr. Balchen will pilot a Northrop Delta plane, which he took with him last month, on a round trip from the Ross to the Wedell seas. On this flight he will be accompanied by Mr. Ellsworth, leader of the expedition. It is planned to have the expedition ship leave Norway for New Zealand August 1. The take-off of the flight in the Antarctic is scheduled for the middle of December.

REVIEWS OF BOOKS

MINUTE EPICS OF FLIGHT

By LUMEN WINTER AND GLENN DEGNER

EPISODES of flight, from the Babylonian story of the flight of Etana on the back of an eagle to the account of the solo flight of Capt. James A. Mollison last year across the North Atlantic, are presented in "Minute Epics of Flight." While this book does not include in detail all the important flights of history, the artist and editor have chosen the principal events of aviation from all times and have written one-page narrations, illustrated with crayon sketches, concerning each.

Considerable space is devoted to pioneer flying in both lighter-than-air and heavier-than-air craft, over half the book being taken up with accounts of flights prior to the World War. Another section is occupied by articles on flights of the War, showing the importance of aviation to both the Allied and the German forces. Post-war aeronautical developments described include famous flights and new designs in airplanes and airships.

AVIATION FROM THE GROUND UP

By LIEUT. G. B. MANLY

PRACTICAL ASPECTS of aeronautics are presented in "Aviation from the Ground Up," a non-technical course of instruction in aeronautics. About half of the chapters of the book are devoted to airplanes and their parts, including engines and instruments. Other sections cover piloting, navigation, parachutes, airports and airways, official regulations, aerodynamics, history of flight and meteorology. Various types of airplanes are described and pictured.

ALL THE WORLD'S AIRCRAFT, 1932

GROWTH in the world's aeronautical activity is indicated in the increased volume of "Jane's All the World's Aircraft, 1932." This gain is particularly marked in the section devoted to airplanes, which contains 351 pages of information and illustrations, as compared with 332 pages in 1931. A total of 427 new illustrations appear in this section in the 1932 edition, while 346 new illustrations were contained in the division in 1931. Twenty-eight countries are noted as building airplanes of their own types.

Interesting new types of engines appear in the section headed "All the World's Aero-Engines," and progress in heavy-oil engines is noted. The book also contains the usual sections on airships and the progress of civil and service aviation, the total number of pages amounting to more than 700.

THE BOOK OF THE SKY

By MATTHEW LUCKIESH

A REVISED and enlarged edition of "The Book of the Sky" reveals sky, clouds and weather as seen through the eyes of an air traveler. Meteorological information is given in instructive, non-technical doses of simple and often beautifully descriptive language. The book is further enhanced by cloud pictures and drawings.

Seven chapters, in addition to new illustrations, have been added in the new edition. These include discussions of "The Ways of the Winds," "The Sky-Vault," origins of weather and weather predictions, lightning, bumpiness and its causes, and measurements and their relation to meteorology. These subjects are connected in an interesting and practical manner with aviation, showing their effect upon flight experience. The remainder of the book follows out the idea of combining the aeronautical and meteorological fields.

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• TRADE LITERATURE •

Aviation Lighting

A PUBLICATION of forty-eight pages, entitled "Westinghouse Aviation Lighting," has been issued by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Containing photographs, photometric data and charts, this catalog illustrates many new and improved developments. Some of the outstanding new apparatus listed includes rotating beacons, code beacons, Fresnel floodlights, flush-type marker lights, signaling searchlights, traffic signals, portable traffic signals, searchlights, floodlights, gas electric sets and traffic control desks. (1)

Welding and Cutting Equipment

THE 1933 CATALOG of the Smith Welding Equipment Corp., Minneapolis, Minn., describes and illustrates cutting and welding outfits and accessories. Featuring equipment guaranteed for the owner's lifetime, the booklet gives details concerning welding torches and tips; cutting assemblies; cutting torches and tips; cutting, welding and soldering outfits; regulators for oxygen, acetylene and air; gauges; regulator adapters; acetylene generators; valves; handles; welders' goggles and spectacles; hose connections; fluxes and other adjuncts for the operations concerned. A helpful table showing gas consumption, length, weight, regulator pressure and other information relative to various sizes of welding tips appears on one of the pages. On the same page are shown actual-size reproductions of openings in the welding tips. (2)

Autogiro Accomplishments

ACHIEVEMENTS of the autogiro for 1932 are covered in "Autogiro Highlights of 1932," published by the Autogiro Co. of America of Willow Grove, Pa. Two pages are devoted to a description and photograph of the Pitcairn PA-19 cabin autogiro, which was developed at the close of 1932.

Interesting pictures of autogiros in action illustrate almost every page of the booklet, while the text describes events in which autogiros took part prominently and new uses found for the ships during the past year, calling attention to the increasing field for autogiros. (3)

Aviation Insurance Information

TWO BOOKLETS, published by Barber & Baldwin, Inc., and Associated Aviation Underwriters of New York City, discuss aviation insurance and its various coverages. Both pamphlets are designed to answer questions of agents regarding the handling of such insurance and give special attention to brief explanations of the usual coverages and to showing the range of rates. (4)

Tractor Catalog

PRODUCTS of the Clark Tructractor Co., Battle Creek, Mich., are pictured and described in a miniature booklet published by the company. On every second page appears a photograph of the various motor-driven manufactures, ranging from lift trucks to flexible conveyors and from sweepers to shovels. Beside each picture is a brief list of specifications, and on the opposite page is a more detailed description of the device and its uses. (5)

Pamphlets About Testing Devices

A BOOKLET describing the Oxweld portable tensile testing machine has been published by The Linde Air Products Co. of New York. Developed by Union Carbide and Carbon Research Laboratories, Inc., this machine meets the need for a practical, efficient method of testing welds and qualifying welders. Details of construction and complete directions for operating are contained in the booklet. There also are explanations of the proper methods of preparing coupons for testing and of calculating the tensile strength. Calculations of the ultimate tensile strength are simplified by a chart of the alignment or nomographic type.

Another development of Union Carbide and Carbon Research Laboratories, Inc., the Oxweld extensometer Type TM-3, is described in another booklet of the Linde company. To augment the usefulness of the Oxweld portable tensile testing machine, the Oxweld extensometer was developed, permitting the accurate determination of the yield point. This instrument also may be employed where the larger stationary testing machines are used for loading and measuring the load on the specimen. The booklet describes the extensometer in detail, how it works, how to use it to determine the yield point and how to use it as a strain gauge to show elongation of a specimen under specified loads. (6)

Crawler Tractor Descriptions

TWO PAMPHLETS issued by The Cleveland Tractor Co., Cleveland, Ohio, contain detailed descriptions of Cletrac Model 80, a crawler tractor manufactured by the company. Photographs of the tractor in use on difficult jobs are shown as well as sectionalized views of the tractor and its various parts. (7)

Pratt & Whitney Engines

ACHIEVEMENTS of Wasp and Hornet engines, manufactured by the Pratt & Whitney Aircraft Co., East Hartford, Conn., are described in an interesting booklet recently published by the company. Performances of the engines in airline and military services are discussed, and other pages are devoted to pictures and articles of pilots and planes taking part in such flights as those of Amelia Earhart, Doolittle, the Haizlips, Turner, Mattern and Griffin and Wedell. A feature of the booklet is an airline map of the United States, distinguishing lines using Wasp and Hornet engines from the other routes. (8)

Pan American Air Mail

INFORMATION concerning air mail service between the United States and Latin America is contained in a pamphlet published by Pan American Airways System. Among features of the booklet are a map, showing Pan American airline service to North, South and Central America; a schedule of air mail closings and rates to Latin American countries, and directions for obtaining the best results in sending air mail. (9)

Year-'Round Air Travel

FACILITIES of United Air Lines in 1933 as compared with equipment for air travel several years ago are described in a folder issued by United Air Lines. Interestingly illustrated, the leaflet emphasizes the comfort, convenience and safety of air travel throughout twelve months of the year, night and day. (10)

● Readers who are in a position to make use of the information reviewed in our "Trade Literature" columns each month, are invited to use this convenient means of securing the complete booklets described—without obligation. Merely fill out and mail the accompanying coupon, checking by number the booklet or catalog you desire.

AERO DIGEST, 515 Madison Ave., New York, N. Y.

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• FOREIGN NEWS IN BRIEF •

AUSTRALIA

AUSTRALIAN EMPIRE AIRWAYS, LTD. has been registered in Sydney, with a capital of £200,000. The new company is to act as agent for Imperial Airways, Ltd. and will facilitate aerial cooperation between England and Australia. Since being formed, the company has united with Q.A.N.T.A.S., Ltd., the object being to tender for Australian air mail service between the Australian capitals and Singapore.

PROVIDED that eight passengers will make the flight, Sir Charles Kingsford-Smith will probably fly the *Southern Cross* to England in August. Two New Zealanders have already booked flight.

CANADA

MAURICE BURBRIDGE, instructor of the Edmonton Flying Club, won the McKee Trophy for 1932, the highest distinction in Canadian flying, awarded annually in memory of the first trans-Canada air flight made by Dalzell McKee. Mr. Burbridge is the first man to have received the trophy since its first award in 1927 for other reasons than exploratory flying over the Northland.

AIR TRANSPORT OPERATORS have their planes in readiness, so that as soon as the ice is out of the lakes and rivers in the Northland, pontoon-equipped fleets will be able to carry to the scene of the Canadian gold boom not only geologists, engineers, prospectors and food supplies, but also heavy mining machinery and base supplies, and to bring out rich ore findings on return trips.

THE TORONTO FLYING CLUB has awarded to David Ely the Keith Russell Trophy for general proficiency of "ab initio" pilots; the Moore-Curtis Award to Harold Hardy, winner of the open competition for general proficiency and cross-country flying, and the Mrs. E. French Trophy to Sid Cleverly as the pilot with the most hours in the air last year.

CANADIAN AIRWAYS has bought Spence-McDonough Air Transport, operating in the Northwest Territories, including God's Lake and Island Lake, mining sections of Manitoba and along the MacKenzie River, carrying freight and passengers.

ALTHOUGH estimates for appropriations for civil aviation in Canada for the fiscal year closing March 31, 1934, were reduced $150,000 below the sum for the previous year, the estimate for air mail service was increased to $361,000, a gain of $136,500 over 1932-33. The total civil aviation appropriation estimate for 1933-34 was $1,600,000.

FRANCE

THE CHAMBER OF DEPUTIES approved an appropriation of 600,000,000 francs for the 1933 aviation construction program last month, according to news reports.

THE MINISTER OF THE AIR announced last month that 100 French military airplanes will fly in formation to Egypt and North Africa and return in November or December.

A REORGANIZATION of the air force, with an independent command equal with the Army and Navy has been approved by the Government. This force will put units under Army or Navy command and will maintain liaison with both groups.

LE BOURGET AIRPORT is to have a central administration building. Housing the meteorological office, post office, transportation and police offices, hotel, restaurant and information bureau, the building will be completed within about eighteen months at a cost from 9,000,000 to 10,000,000 francs. A large concrete runway and an improved lighting system also are to be installed.

THE PRESIDENT of France recently inaugurated The National Superior School of Aeronautics, a superior air school under State auspices. Admission to the school is by competitive examination. Lasting three years, the course includes one year of preparation and two years of applied study. Graduates of the institution are eligible for all aeronautical technical posts. A certain number of foreigners are admitted as students.

GERMANY

THE *GRAF ZEPPELIN*, which is to resume regular service between Europe and South America on May 6, will also make a number of short pleasure cruises over Europe, according to the Hamburg-American Line, general agents of the Luftschiffbau Zeppelin Co. Short cruises over Switzerland are scheduled for May 23 and 26, June 20 and 22, July 18 and 20 and August 22 and 24. On May 29 and 30 there is to be a cruise over Italy, with an intermediate landing at Rome. For July 22 to 24 a cruise over Spain is planned.

NEGOTIATIONS for the establishment of dirigible service between North America and the East Indies by way of Europe are reported to have been resumed following Dr. Hugo Eckener's return from a trip to the East Indies. Plans also include an airship line between Europe and South America, the two routes having a junction in Spain.

LICENSED GLIDER PILOTS were to be taught blind flying in gliders at the Griesheim airport near Stuttgart recently. The Wasserkuppe Gliding School of the Rhoen-Rossitten organization was to be in charge of instruction.

THE STEAMSHIP *Westfalen*, which has been undergoing tests as a floating airport, was successfully demonstrated recently in the Weser River before officials of the Ministry of Transportation. The ship will be used as a stopping place in the South Atlantic for planes on the airline between Berlin and Rio de Janeiro which it is proposed to establish in 1934.

GREAT BRITAIN

THE COUNCIL of the Royal Aeronautical Society has awarded the society's gold medal to Sir Richard Glazebrook, K.C.B., F.R.S., Fellow of the Society. The highest honor which the society can

The F.W. 44 "Goldfinch," latest type Focke-Wulf school and sport plane confer, the gold medal has been awarded only six times previously.

Sir Richard Glazebrook has been chairman of the Aeronautical Research Committee since its foundation in 1909 as the Advisory Committee for Aeronautics, retiring from the position last month.

AN AERIAL DISPLAY at Inverness, Scotland, early this month is scheduled to inaugurate a regular air service in the Highlands which will afford fast communication between Inverness, Thurso, Wick and the Orkney Islands. Plans for later development include extension to Elgin and Aberdeen.

The timetable provides for an airplane to leave Inverness at 10.30 a.m. every day and to arrive at Kirkwall at 11.30 a.m. after an intermediate stop at Wick. Two journeys each way will be made between the islands and the mainland before the return flight to Inverness is begun from Kirkwall at 5.30 p.m., arriving at Inverness at 6.30 p.m. The best available surface transport requires three days for the same journey.

THE HIGHEST POINT on the earth's surface, Mount Everest in the Himalayas, was flown over for the first time April 3 by two Westland biplanes of the British expedition headed by Air Commodore P. F. M. Fellowes. One of the planes, the Houston-Westland, carried Squadron Leader, the Marquess of Douglas and Clydesdale, chief pilot of the expedition, and Lieut.-Col. L. V. S. Blacker; the other, a Westland Wallace, carried Flight Lieut. D. F. McIntyre, pilot, and S. R. Bonnett, photographer. The two airplanes reached a height of 31,000 feet near the summit of Chamlang, a mountain located south of Everest, and less than an hour later both machines cleared the summit of Everest by 100 feet, or at a height of about 29,200 feet. For fifteen minutes they circled over the mountain, while Colonel Blacker and Mr. Bonnett took still and moving pictures of the panorama around them. The only limit to vision was the curvature of the earth's surface. Two complete circuits were made of Everest, the pilots putting the airplanes into steep banks to enable the observers to obtain good photographic views.

Each of the Westland airplanes which made the flight was powered with a single Bristol Pegasus S.3 fully supercharged 525-580-horsepower air-cooled radial engine, similar to the engine which took Cyril Uwins' biplane last autumn to the world's record height of 43,976 feet. The Houston-Westland was built some time ago for the Air Ministry. It has folding wings and an unusually wide landing gear. The other machine is a standard Wallace general purpose aircraft, shorn of its military equipment. All fittings such as wheel fairings and wheel brakes were removed to save weight in order that the required height might easily be reached with the heavy load which was to be carried during the flights, comprising pilot and observer, ninety gallons of fuel, oxygen-breathing and electrical heating apparatus, cameras and many special instruments. The observer's cockpit in each airplane is enclosed, and sliding windows are provided for work with the cameras.

A NEW TYPE of three-seater reconnaissance biplane ordered by the Air Ministry for use in the Fleet Air Arm is fitted with special flotation gear which makes it practically unsinkable. Most of the interior of the fuselage is filled with air bags, and recent tests have proved the value of the system not only in facilitating salvage of a machine after a forced descent on the water but also in affording the crew increased chances of rescue.

One of these airplanes, which bear the type name Fairey "Seal," was deliberately brought down onto the sea. A Naval pinnace struck it accidentally while it was floating and damaged the tail unit and fuselage. A few minutes later a large warship ran it down, driving it completely under water, but the machine bobbed up on the other side of the vessel, apparently little the worse.

The planes may be equipped with landing wheels for operation from the flying decks of aircraft carriers or with floats. Equipment carried enables the craft to be employed in a diversity of duties, including bombing, fighting, reconnaissance, gunnery spotting and aerial photography. Equipped with an Armstrong Siddeley 535-horsepower Panther air-cooled radial engine, each plane has a normal range of approximately 650 miles, which is increased to nearly 1,300 miles by the addition of tanks carried below the wings. Special care was taken during design to enable the Seal to endure the changing climatic conditions and hard usage involved in Fleet Air Arm work. The structure is specially strengthened at essential points to withstand the shocks of catapult launching.

THE BOULTON-PAUL P.64 biplane has been constructed as a new mail plane. It is a twin-engined craft, powered with two Bristol Pegasus moderately supercharged engines which are rated at 555 h.p. when 4,500 feet above sea-level, and has been designed to maintain cruising speed on half the maximum power available. Even if one engine should fail, the P.64 will continue in level flight with the remaining engine running below maximum revolutions. The fuselage is well streamlined, Townend ring cowls encircle the engines and the landing wheels are carried in streamlined housings just below the lower wings. A seaplane landing gear may be substituted for the landing wheels.

Maximum estimated speed of the plane is 195 miles per hour at a height of 5,000 feet. Cruising speed is about 172 miles per hour, and the maximum range with the normal fuel supply is about 1,250 miles. The rate of climb at 4,500 feet is 1,400 feet a minute, and the absolute ceiling is 25,000 feet. The pilots sit in a totally enclosed cockpit fitted with sliding windows and roof light, in the nose of the fuselage, and there is also room for a third member of the crew. The total disposable load is two tons, with a gross weight of 10,500 pounds.

The Boulton-Paul designers have prepared plans for two modified versions of the mail plane. One of them, a fast passenger carrier with a roomier fuselage than that of the mail plane, will accommodate seven passengers and two pilots. The other will also carry seven passengers and a crew of two and will be powered with two 340-horsepower Armstrong Siddeley Serval air-cooled engines, reaching a maximum speed of 175 miles an hour. Its normal range will be 450 miles.

"SERVAL" is the name officially adopted for the new Armstrong Siddeley "Double Mongoose" 340-horsepower radial engine. This engine, consisting of two five-cylinder Mongoose engines on a common crankcase, has been selected for installation in the Saro Cloud flying boats, being built to take the place of obsolescent flying machines attached to the Calshot seaplane station. They are also employed in the Armstrong Whitworth Atalanta monoplane airliners designed for service in Africa with Imperial Airways.

THE GREAT WESTERN RAILWAY was planning last month to inaugurate a daily airplane service between Cardiff, Wales and Torquay and Teignmouth, a journey which takes four hours by train and forty-five minutes by airplane. Later in the summer the service may be extended to Plymouth and St. Ives.

LAST MONTH Edward Hillman, who operates special charter and air transport services within Great Britain, opened a service between London and Paris. Two airplanes will fly daily in each direction between the Hillman airdrome at Romford, near London, and Le Bourget. The aircraft employed are de Havilland Dragon twin-engined cabin biplanes, each fitted to carry five passengers. Cruising speed of these machines is 110 miles per hour, and they are designed to maintain level flight with full load on board, even if one engine should become disabled. Wireless apparatus is carried, enabling the pilot to maintain touch with London and Paris throughout the journey.

THE SILVER MEDAL of The Royal Aeronautical Society has been awarded to D. L. Hollis Williams for his work in connection with the design of the long-range monoplane and to A. H. R. Fedden for his activity in connection with air-cooled engines and particularly for his work in connection with the height record.

LEAVING the London airport each afternoon at 5 p.m., a new evening air service to Paris inaugurated by Imperial Airways now enables passengers to reach the French capital at 7.15 p.m., the service in the reverse direction from Paris to London flying on the same time schedule.

Airliners of the company recently completed a mileage of 10,000,000, the planes flying nearly 6,000 miles a day.

Reductions in passenger insurance rates by air have been completed by Imperial Airways, enabling passengers by the company's routes to obtain accident insurance policies at low rates.

WITH A FLEET of de Havilland airplanes, the Scottish Motor Traction Co. proposes to inaugurate regular airlines throughout Scotland and the north of England, combined with special charter and newspaper services. Working and control will be divided between the two groups into which the company is subdivided, one operating from flying headquarters at Turnhouse Airdrome near Edinburgh and running services through eastern Scotland and northern England, and the other, from Renfrew Airdrome near Glasgow and taking care of services through the West of the country. The chairman of this firm is W. J. Thomson, Lord Provost of Edinburgh.

ITALY

ITALIAN AIRLINES have flown 20,500,000 kilometers without an accident in the last six years of operation, according to a recent report. Passengers have increased from an annual 3,000 in 1926 to 50,000 in 1932, and freight during the same period, from 10 tons to over 1,000 tons. Air routes have grown from 5,000 kilometers in 1926 to 5,000,000 in 1933.

LIEUT.-COL. MARIO DE BERNARDI has accepted the command of China's military air force. At one time winner of the Schneider Trophy, Colonel de Bernardi will leave shortly for China to take his new post.

MEXICO

A THRICE-WEEKLY PASSENGER SERVICE has been inaugurated by the Mexican Aerophoto Co. of Mexico City between Guadalajara and Puerto Vallarta, a Pacific port resort. Service will be daily if passenger business continues to increase, the management says. A Ryan four-passenger plane with a cruising speed of 100 miles an hour is being used in the service. The company has detailed a Fairchild plane to make an air survey of Alvarado, Vera Cruz State, for the Federal Government.

THE MINISTRY of Communications and Public Works has advised all passenger carrying enterprises in Mexico, that under an amendment to the general communications and transportations law they are obliged to insure the lives of their paid riders. The Ministry explains that the maximum compensation these companies are obliged to pay in any single case is 5,000 pesos, and that the law provides that the companies are allowed thoroughly to investigate all claims for compensation that are made against them under this insurance. The companies are also permitted to raise their passenger fares in a proportion that will cover the costs of insuring their paid riders.

A CONCESSION for the operation of a regular passenger, mail and express service between Mexico City and Nuevo Laredo, on the United States border across from Laredo, Tex., has been granted Federal Senator Carlos Garza Castro and associates, according to the aviation section of the Ministry of Communications and Public Works. A seven-passenger Lockheed Vega cabin plane, powered with a 420-h.p. Wasp engine, has been used in testing the new route.

CENTRAL AIRWAYS of Mexico, operators of an airway between Mexico City and Ciudad Juarez on the United States border, have been flying on a trial basis a passenger and mail branch line down the Mexican Pacific Coast from Ciudad Obregon to Mazatlan. Stops are made at Navojoa, Sonora, and Los Mochis and Culiacan, Sinaloa. Lockheed Vega and Fairchild four-passenger planes are used.

APPLICATION for a concession to establish a passenger, mail and express aviation service between Tuxtla Gutierrez, capital of the southeastern state of Chiapas, and San Cristobal and Arriaga, important towns in that commonwealth, has been filed by Francisco Sarabia and associates, according to the air communications department of the Ministry of Communications and Public Works.

THE AERO CLUB of Mexico, with headquarters in Mexico City, is organizing an air excursion of Mexican civil aviators to the Central American countries. The tour will terminate in Panama. This will be the first time that Mexican civilian fliers ever made a collective excursion abroad. The club, in announcing that at least twenty-five planes will participate, has stated that the departure date has not been set. The club has named the following as its officers for 1933: Lawyer Gustavo Espinosa Mireles, vice president of the Mexican Aviation Co., president; Lieut.-Col. Fernando Proal, of the Army Air Service, vice president; Rafael Olguin, secretary, and Julius Zinser, treasurer. The club was established three years ago. Several American resident civilian aviators are among its members.

MIDDLE EAST

THE FIRST INTERNAL AIRLINE to be operated in Iraq was scheduled to be opened last month. A new company, Iraq Airwork Ltd., was to commence a regular weekly service from Baghdad to Kirkuk and Mosul. Three-engined Spartan Cruisers, powered with Hermes IV engines and with cabin accommodations for six passengers, are the equipment. Capt. T. Neville Stack is air superintendent for the new company.

PERSIA

ORDERS for military equipment including airplanes and engines are being placed in the United States to the extent of over $5,000,000 by the Persian Government, according to a recent report. Capt. Sadegh Chaybanyi of the Persian Army has been sent to the United States as agent for the Minister of War in relation to the purchases. British, French and German firms have previously supplied a great part of Persian aeronautical equipment.

SWEDEN

NIGHT AIR MAIL SERVICE twelve months a year is planned for Sweden. The Swedish Air Transportation Co. will operate the service, which will involve the establishment of weather forecast and radio services and the lighting of the air routes and airports. Other Nordic countries are expected to cooperate financially with Sweden to insure the provision of the night air mail service in northern Europe throughout the year.

TURKEY

AN AIRLINE between Istanbul and Ankara, using two Curtiss-Wright passenger monoplanes, is to be opened soon, it was announced recently. The air service will mark the first step toward establishment of an air route connecting Istanbul with Sivas, Diarbekir, Erzerum and Kars. It is to be under the control of Minister of National Defense Zekai Bey, but American industry and capitalists are to be in charge of the organization work.

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32 Hammond's folder explains easy flying and safe landing...Page 59.

33 C-W expresses a word to the ambitious, in their newest literature on aviation training...Third Cover.

34 Waco illustrates and describes its 1933 line of open and closed planes...Page 27.

35 An attractive booklet explains the profits and efficiency of seaplane flying. Page 58.

36 Ryan's literature tells of their new courses and reduced prices...Page 2.

37 Aeronca's folder describes the new improved "Collegian"...Page 51.

38 Where you can secure Kendall's 30-hour oil. Page 9.

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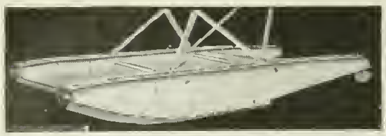

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AIR—HOT AND OTHERWISE

(*Continued from page* 16)

at this time than a policy of short-sightedness. We have suffered from that failing in the past. It was not so serious then. The Binghams of aviation even were incapable of missing all the chances. Now it is serious. Aviation stands at an important cross-road. The opportunity is here for sound and practical experimentation. The time has come to get our national aviation policy in hand. It can afford sensible economy, the kind that will cut out red tape, eliminate the boll weevils, and make for a greater efficiency. In times of prosperity perhaps we could permit, even if we could never approve nor applaud, bureaus and organizations which were in existence merely because they had climbed on the "flying bandwagon." Not today.

Today economy dictates, and practical experimentation makes logical, the viewing of American aviation as one single subject. AERO DIGEST strongly urges the immediate appointment of a joint committee composed of Army and Navy officers and civilians to work with Director of the Budget Douglas to see that aviation shares its logical and fair burden of national economizing, and that it shares it sensibly.

"UP SHIP!"

(*Continued from page* 13)

lines fail to win financial backing or some government's support, then interest in the rigid soon will end, at least for the time being and until money is easier. Excuses for past failures and high hopes for future success are of little value. The question is: Considering the cost in lives and money, what can the rigid airship give the American taxpayer in return for that cost? What can it give now, and in the near future? If it isn't safe now, can it be made safe? Realizing that no vehicle that moves in the air, on the sea or on the land is absolutely safe under all conditions, then can it be built and operated with a margin of safety sufficient to justify occasional losses?

I see only one use for the airship in the United States Navy. The Pacific is a wide ocean; if we ever are at war with a power whose navy operates in the Pacific, the airship with its long range and its capability of staying in the air for days, and even weeks, could be of incalculable advantage to our Navy. Day and night it could act as a long-range scout, covering expanses of ocean where our own Navy was not, but where the enemy's navy conceivably could be. True, it is a vulnerable scout; if it made contact with the enemy's aircraft, it would stand a good chance of being destroyed, though it could radio its information. But so would a cruiser, working on a like mission, stand a fair chance of destruction. And the airship, built in quantity, probably would not cost over $3,000,000, and would carry a crew of 75 men, while the cruiser, no matter in what quantity it was built, would cost $14,000,000 equipped and carry a crew of 500 men.

No navy, even with seaborne aircraft, can cover the Pacific Ocean against all surprise attack. Naval forces cannot be spread out in individual units and yet operate as a force; they must move in squadrons, else they cease to be a force and become only so many vessels. There is need of the lone scout, and to my way of thinking the rigid airship is the most logical craft for that purpose. It is ideal

(*Continued on following page*)

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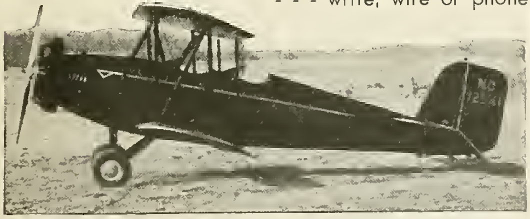

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(*Continued from preceding page*)

for negative scouting; that is to say, to be able to report definitely where the enemy forces are not—which sometimes is as useful as to know where they are. If at all times you know areas where your enemy isn't, it narrows down your knowledge of where he must be. With conditions as they are in the Pacific, the development of the rigid airship should eventually be worth its cost to the United States Navy.

With this naval use in view, a subsidy for airships for ocean air mail service seems justified, on the same basis that the mail subsidies to steamship lines are justified—to build up a commercial service that will be available in time of war. Rather than build dozens of naval sea transports, to lie idle in times of peace, it is expedient to subsidize commercial ocean lines, which is being done. And why not follow the same plan in relation to airships that in time of war could be requisitioned and put with the fleet as scouts, on precisely the same basis that England's large ocean liners were taken over in the last war and converted into armed troop carriers?

There would be no lack of passengers for a fast transoceanic air service. To many, a sea voyage is one of illness; they would welcome the calmness of flight—provided that the gentleman in charge flew around storms. And, contrary to general belief, the public does not demand, and certainly does not get, absolute safety when it travels, on land, sea or up in the air. Yet it travels. Knowing full well that the *Vestris* sank, that the *Titanic* went to the bottom, people still cross oceans; knowing that airliners have been wrecked, people fly with no fears sufficiently strong to deter them. With all of the grievous tragedies of the Zeppelins fully reported in newspapers at the time they happened, the *Graf Zeppelin* always flew with full passenger lists. If a Zeppelin service started tomorrow across the Atlantic, the ship would be filled. If the owners offered me a flight (and the ship was helium filled), I certainly would be aboard myself, as I also was aboard the *Akron*. And I wouldn't think I was just as safe as though traveling on an ocean liner. I wouldn't be as safe, nor would I expect to be until the science of the airship is further advanced. After all, is life so precious that we should be mortally afraid to take some little risk with it? Who but the coward devotes all of his energies to being safe? Life is to be lived without tremors, not too daringly and never, if possible, foolishly; but always courageously. None of us can live forever—and who wants to?

I hope that the rigid airship doesn't go; it is too wonderful an achievement; it has cost too much in lives and money and shattered hopes for us to give up now and declare that all was wasted. Despite the failures, it is too soon to give up. So in words used in the course of their duties by those gallant American sailors who have given their lives in the course of this brilliant and courageous experiment, let us say, "UP SHIP!"

EDITORIALS

(*Continued from page* 17)

Executives of airlines and airports must agree upon some definite policy to protect their interests from hurtful exploitation. They have no one but themselves to blame if they cooperate with a motion picture producer, only to learn eventually that the resulting photoplay is a sensational misrepresentation of sane flying. It is the legitimate

(*Continued on following page*)

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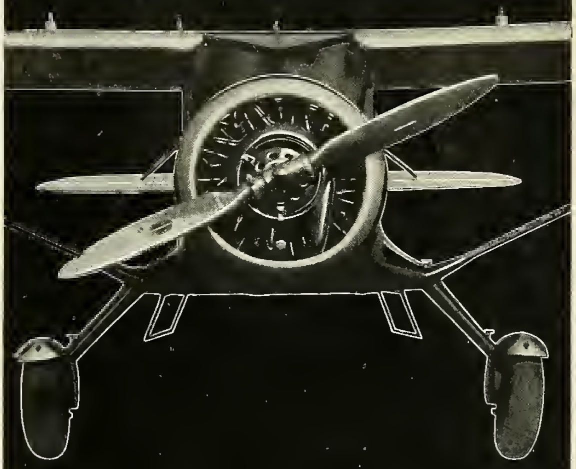

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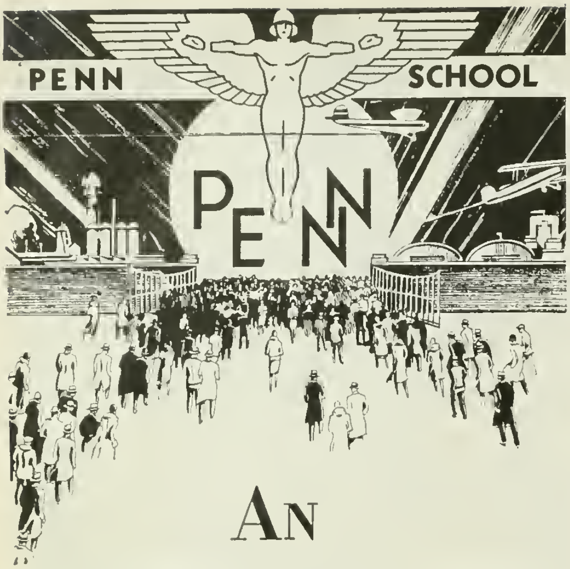

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(Continued from preceding page)

business of the movies to interest their audiences, so they hew to the line of excitement, let the ships fall where they may. Aviation people should understand this, and be guided accordingly.

◆

The Arms Embargo Racket

Governmental embargoes on arms are a fine thing, but let us talk about them hereafter in a practical way; and let us by all means not be hoodwinked by our competitors in the export field. Arms embargo can apparently mean one thing in one place; another thing in another. Many foreign countries count rather heavily upon just that. As regards the export of air equipment through or over embargoes, it is apparently the intention of some of the so-called friendly first powers that America shall be left continuously holding the Peace baby. It is wholly unfair to require American airplane export to stop completely while other countries continue to ship into a zone under embargo flying equipment which are commercial planes in name only.

NOTES ON TAKE-OFF CALCULATIONS

(Continued from page 19)

Aircraft." In order to obtain the water resistance it is necessary to divide the gross weight by the factor K which was obtained by dividing the displacement by the values of displacement to resistance ratios. The air resistance is calculated by assuming an average angle of attack.

Seaplane Resistance with Wind

In the case when it is necessary to obtain the take-off characteristics into the wind, it must be borne in mind that the water resistance is a function of the ground speed and dispacement only while the air resistance and lift are functions of the relative air speed. To calculate, therefore, the water resistance, the getaway speed is taken as the ground speed at the instant of getaway or $V_{gw} = V_g - V_o$, where V_g is the assumed getaway speed in calm and V_o is the wind speed. Knowing V_{gw} the values of Δ/R are obtained from Table 1, where the values of V/V_g in this case represent in reality V_w/V_{gw} or the ratio of ground speeds to the getaway ground speed.

To find the displacements it is necessary to use the air speeds or $V = V_w + V_o$. The displacement $\Delta = W[1 - (V/V_g)^2]$. The water resistance is then obtained by dividing Δ by Δ/R. Air resistance can be obtained as $D = W(V/V_g)^2/(L/D)$.

Excess Thrust and Accelerations

In order to obtain excess thrust it is necessary to subtract from the values of thrust, which are naturally obtained and plotted against air speeds, the corresponding values of total resistance. In calculating the total resistance one must be careful to combine the air and water resistance, taking into account the relative air speed and the ground speed. For the purpose of take-off time and length of run calculation, the excess thrusts, accelerations, time and distance are plotted against ground speeds. From $f = m.a$

(Continued on following page)

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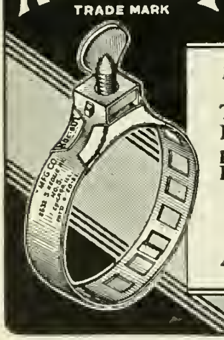

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(*Continued from preceding page*)

we have $a = \frac{f}{m}$. In the case of seaplanes, the mass to be accelerated in addition to the mass of the airplane proper must include an allowance for the so-called "wake mass." The latter is a variable, but in view of other uncertainties it will suffice to use a constant empirical coefficient of about 1.15 to 1.25. The mass to be accelerated becomes then (1.15 to 1.25). W/g, where g is the acceleration of gravity and can be taken as 32.2 ft/sec^2. Dividing the values of excess thrusts by the calculated mass we may plot the curve of accelerations against speeds.

Time of Take-off Run

Since $a = dV/dt$ we can write approximately $a = \Delta V/\Delta t$ where ΔV and Δt indicate small increment of speed and time respectively. From the latter expression we obtain $\Delta t = \Delta V/a$ or that for a given speed increment the time increment can be obtained by dividing the former by the average acceleration. Table 2 gives a suggested form of tabulating the calculations.

Length of Take-off Run

To obtain the length of take-off run we write $V = dS/dt$ or approximately, for small intervals of distance and time, $V = \Delta S/\Delta t$. From the last expression we find $\Delta S = V\Delta t$, which means that for a given increment of time the increment of distance is given by the product of the average speed times the increment of time. The total distance $S = \Sigma\Delta S = \Sigma V\Delta t$, which indicates that the total distance is given by the area under the speed curve plotted against time.

The calculations may be recorded in the form of Table 3. Tables 2 and 3 enable one to plot various variables and thus obtain a graphic picture of the whole take-off problem.

It will be observed that the resistance curve will present a definite peak at a certain speed which is known as the "hump" speed. The hump speed represents the critical condition of the take-off of a seaplane, since it is at that particular point that the curves of resistance and thrust approach closest, with the result that the excess thrust may be either lacking or insufficient to enable a successful take-off. To enable take-off in that case, two principal courses are open—the decrease in gross flying weight or the adoption of a different propeller, either of which would result in higher thrust curve.

In the second part of this article will be found the take-off analysis for land planes and brief outline of thrust calculations pertinent to the solution of take-off problem.

(*To be continued in the June issue of* AERO DIGEST.)

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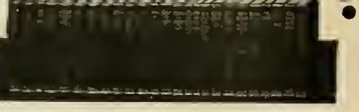

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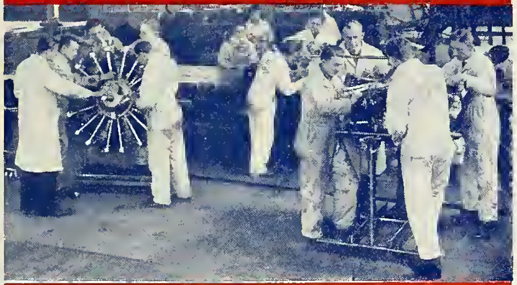

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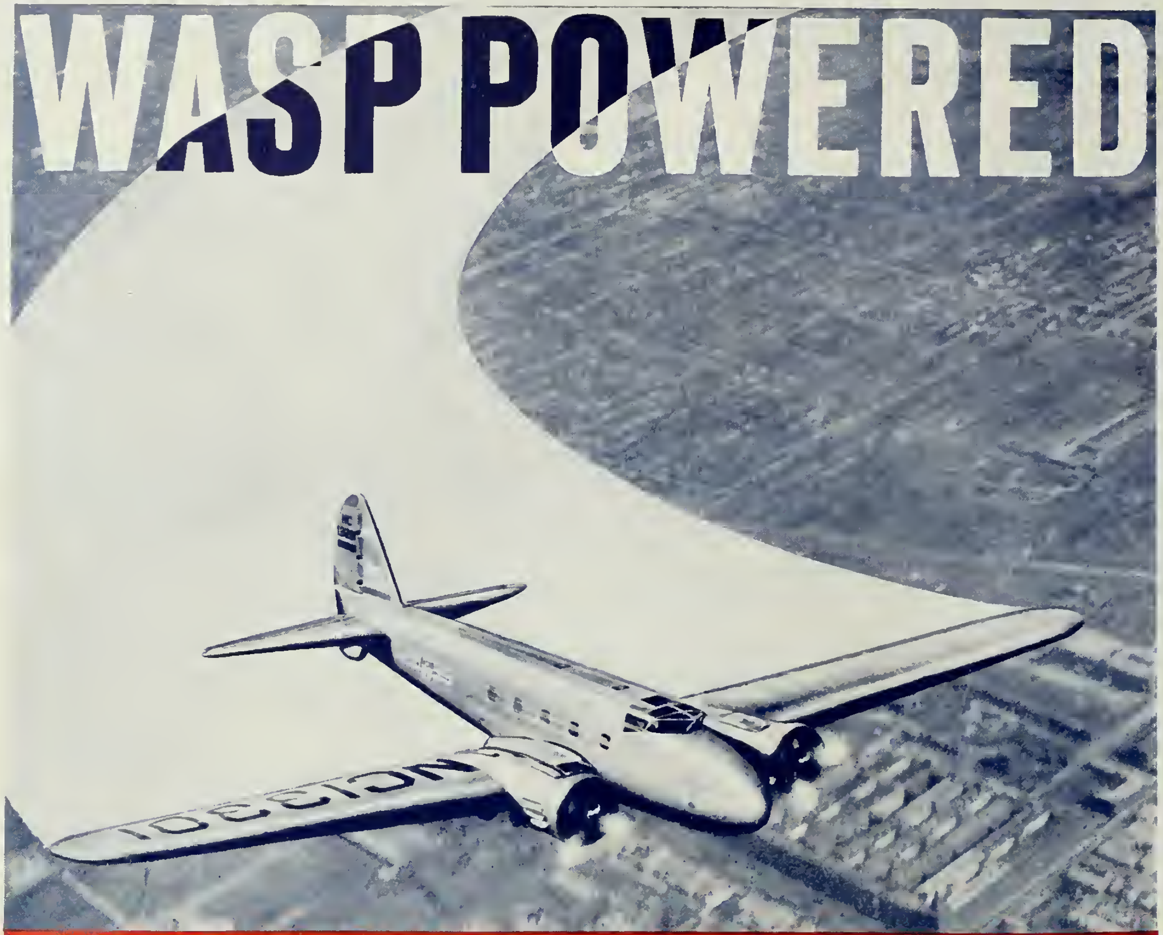

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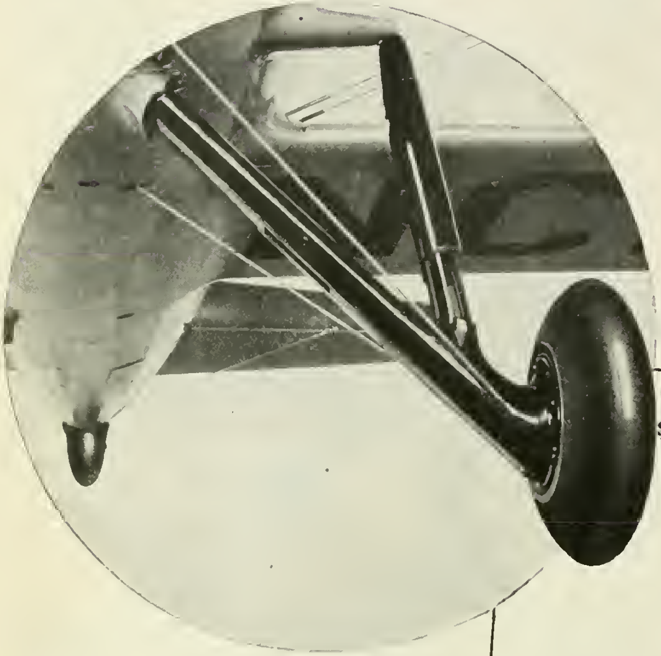

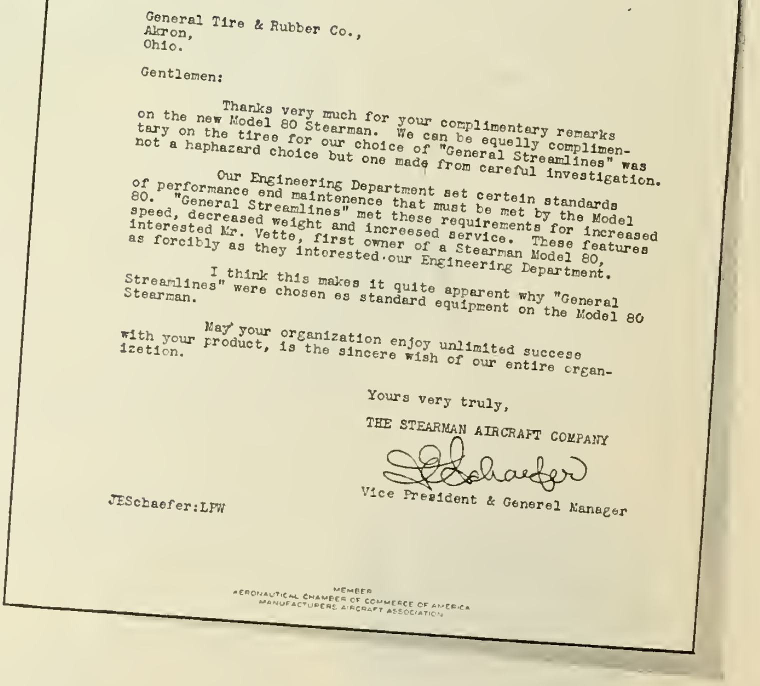

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JULY 1·2·3·4

LOS ANGELES MUNICIPAL AIRPORT

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Curtiss-Wright-Reynolds Airport SEPT. 1-2-3-4

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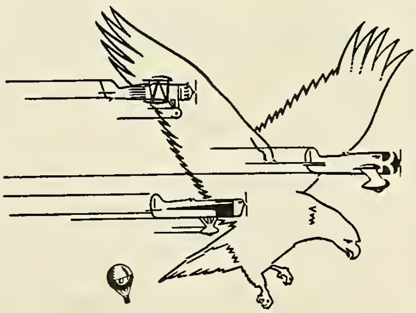

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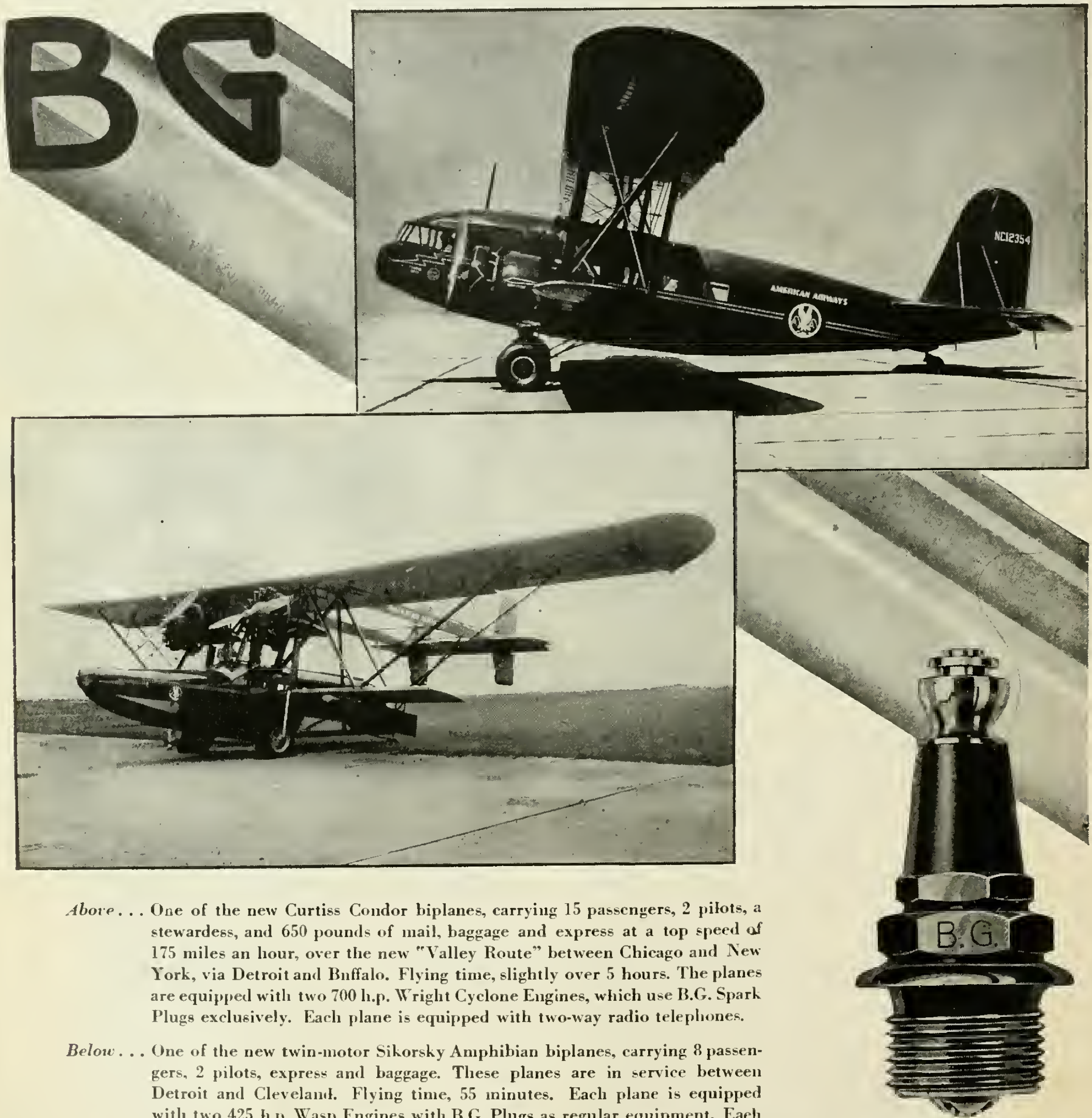

Above . . . One of the new Curtiss Condor biplanes, carrying 15 passengers, 2 pilots, a stewardess, and 650 pounds of mail, baggage and express at a top speed of 175 miles an hour, over the new "Valley Route" between Chicago and New York, via Detroit and Buffalo. Flying time, slightly over 5 hours. The planes are equipped with two 700 h.p. Wright Cyclone Engines, which use B.G. Spark Plugs exclusively. Each plane is equipped with two-way radio telephones.

Below . . . One of the new twin-motor Sikorsky Amphibian biplanes, carrying 8 passengers, 2 pilots, express and baggage. These planes are in service between Detroit and Cleveland. Flying time, 55 minutes. Each plane is equipped with two 425 h.p. Wasp Engines with B.G. Plugs as regular equipment. Each plane is also equipped with two-way radio telephones.

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AERO DIGEST

VOLUME TWENTY-TWO NUMBER SIX

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Waco Model UIC twin-float seaplane, powered with a Continental 210-horsepower engine.

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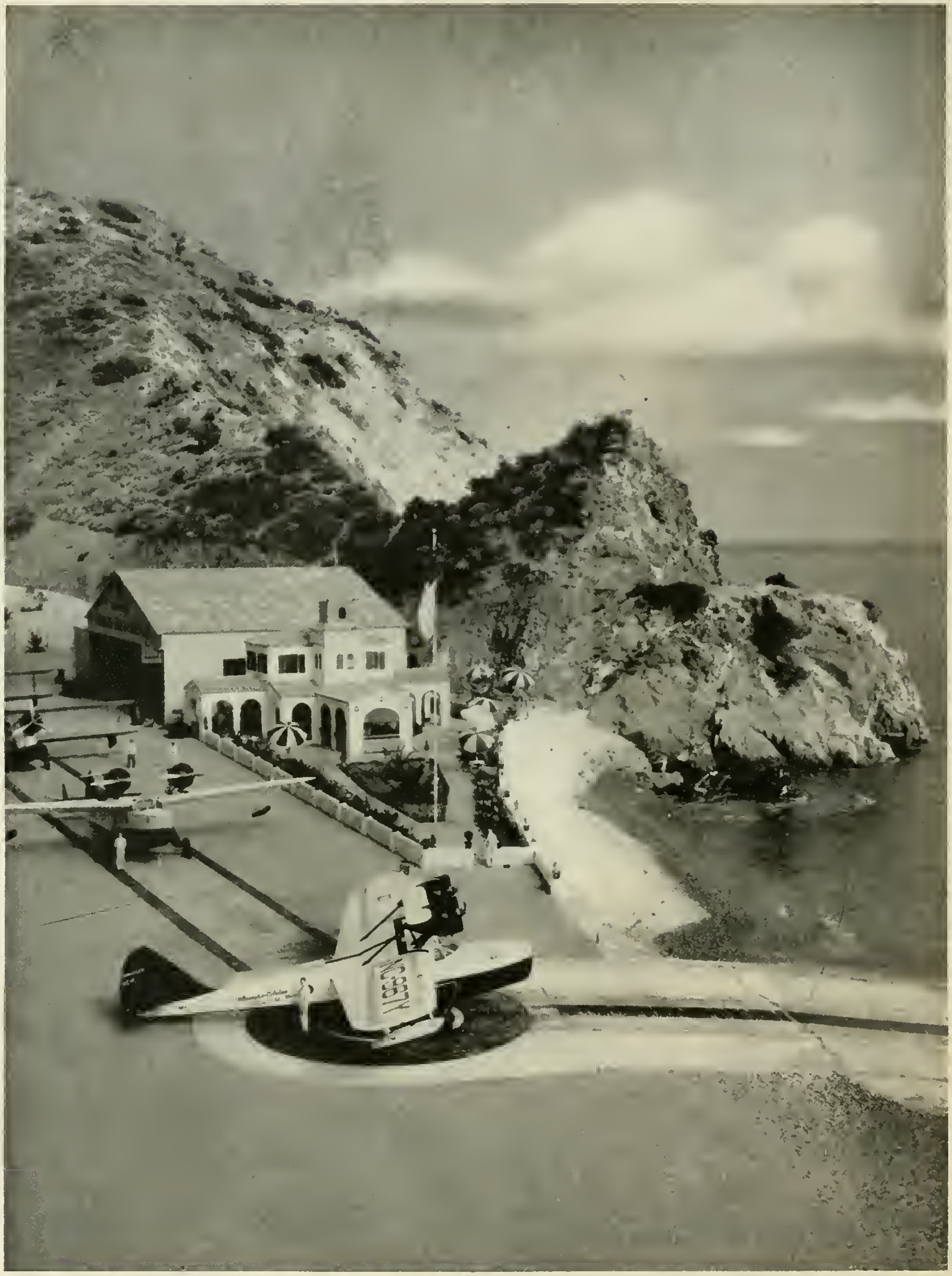

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AVALON AIRPORT

The attractive seaplane base on Catalina Island, California, port of call for the aerial visitor

AIR hot and otherwise

FRANK A. TICHENOR

Your Partner . . . Your Pal

● Under the terms of the most important legislation now pending in Congress, legislation of such a far-reaching nature that its ultimate significance in American industrial life cannot be accurately determined at this time, one of the weakest links in the American aeronautical industry may be called upon to do the work which can be borne only by the strongest link imaginable.

The proposed legislation to which we refer is known as the "National Industrial Recovery Act." By competent Washington commentators it has been called the most revolutionary gesture in the history of American legislation. In its broadest application, it makes the Government a partner in your business.

Even now, few of the most astute thinkers of the aeronautical industry can see anything particularly alarming about the situation. But the fact is that the Government, of course, cannot become directly a *partner,* and thereby a directing and dictating power in a factory in Wichita, and another kind of partner and directing head in Los Angeles. It must serve in this new role for an industry as a whole, and the plan is to do this through the trade associations.

Our *trade association?* Have we got a trade association? Well, AERO DIGEST in its long campaign of calling attention to the practices, motives and conduct of the Aeronautical Chamber of Commerce has never seen occasion to dignify the Chamber with that importance.

We have frequently had occasion to question the value of an organization conducted along the lines of the Aeronautical Chamber of Commerce. In our criticism, which we had hoped would be helpful to the industry, we have not overlooked the fact that the Chamber has been altogether fortunate in the selection of some of the leaders of the aeronautical industry who have been called upon to serve as the Chamber's nominal head. The service which certain of the Chamber's heads have rendered is beyond question. The active management for which the membership is responsible, and of which AERO DIGEST, however, has complained frequently, has gone on unchanged, spending $564,806.41 in six years for returns to the industry of extremely doubtful value.

At the annual meeting this year. Thomas A. Morgan was elected President. Morgan has a record of doing things. He is making headway with Curtiss-Wright and this is a big job in itself. Morgan didn't have a bed of roses to rest upon when the Wall Street bankers passed this much abused baby to him. So, we've been living in hope of a change. but we need the change NOW before it's too late. Get busy, Tom!

Last November we had occasion to write: "Why not put the Aeronautical Chamber of Commerce to work and give them something to do to justify their existence? Keep them busy and there would be less destructive politics and more constructive activities in the interest of the industry and not in the interest of individuals. Think this over, members of the Chamber, and when we have the 1933 election, nominate and elect officials and give them assistants who have courage enough to do this work. The industry is entitled to a fair break and will get it when we get after it properly. SELAH."

Statement in January Recalled

As recently as January of this year we wrote in AERO DIGEST concerning the active management of our trade association:

"The Chamber should get a man with real ability, someone who knows how. someone never before connected with any of the rival organizations and therefore free of the deadening influences of jealousies, politics and prejudice. Such a man might be high priced, but salary doesn't matter. Ten, fifteen, twenty thousand—if the man knows what to do and how to do it any salary will be cheap. In these days when really big executives as well as workmen have been 'let out' all over the country, it should not be hard to find exactly the right man or expensive to secure him. If the muddlers and the self-seekers can only be kept out of the picture! Calling on the President and being photographed before the White House will not get new business or new appropriations for an industry which needs both."

We believe that this criticism of what our trade association deemed to be its "duties" is as correct today as it was five months ago. Yet this is the organization whose active management is preening itself to be the real power to run the aeronautical industry under the terms of Senate Bill 1712.

The administrator of the National Recovery Act, when he is appointed, must of necessity assume that the industry is prepared to have itself represented by this organization, that the industry looks upon the Aeronautical Chamber as its trade association, and it is through this organization that the Government will become a partner in the business of American aviation.

First, we ask the leaders of aeronautics, in view of the past record of the Chamber, if they are prepared to have the Chamber's active management become in effect a super-board of directors, interpreting to the Government, our new partner, the needs and the interests of aeronautics, and responsible for the plotting and the recommending of the course which the industry shall follow.

The idea is revolutionary, we admit. But the idea is upon the verge of becoming a fact. And in this hour of fear, AERO DIGEST is proud of the ceaseless war which it has waged in pointing out the wholly useless path of folly which our trade association has followed. We do not pretend to be a prophet. Frankly, we never dreamed that some day the Aeronautical Chamber might become an important instrument for the rescue of the entire industry. Although AERO DIGEST has frequently sympathized with those groups and individuals who relinquished their membership in the Chamber from time to time, on the ground that it was of no benefit to them whatever (and we frequently were forced to advise such a course), we also understood that viewpoint which said, "After all, there is no other trade association to which we can belong."

Success Depends Upon Efficiency

There is one more hard truth for aeronautical leaders to consider in this alarming and ironical situation. Regardless of the efficiency of your own business organizations, it is only through the trade association that the Government, as your new partner, will deal with you. Your success of recovery then is wholly dependent upon the efficiency of your trade association; only those industries will fully recover which have reputable and business-like trade associations. We will see no more individual scampering to Washington to see who can get the biggest slice of the air mail pie. Your Chamber, gentlemen, will be asked to say who should get what and why. Indeed, an ironical situation!

And there is just one more bitter pill in this dose of medicine which aeronautics may have to swallow: While the Industrial Recovery Bill is assumed to be emergency legislation, the best informed in Washington today believe that the new set-up will be permanent. The Government is to be a partner in business forever. The Aeronautical Chamber of Commerce *forever?*

Attack Aviation

MAJ. GEN. JAMES E. FECHET, U. S. ARMY (RET.)

Business end of the Curtiss "Falcon" A-3

● Attack aviation is that class of military aviation whose function is the attack of personnel and light materiel objectives by means of machine gun fire, light bombs and chemicals. The principal missions of attack aviation are the destruction or immobilization of hostile reserves and reenforcements of personnel and material, and the destruction or neutralization of hostile anti-aircraft establishments. "Ground strafing" is the popular name for attack missions.

Although the desirability of using light bombs and machine gun fire against personnel and light materiel targets was recognized early in the World War, the formation of separate aviation units for this purpose did not take place until toward the end of that conflict, as it was considered practicable for observation, bombardment and pursuit aviation to carry out what we now designate as "attack missions" without interfering with the accomplishment of their normal functions. The pilots of both sides made voluntary attacks against front line units and local reserves as opportunities presented themselves but contributed nothing toward the gaining of the decision. These efforts, however, pointed out the value of this form of warfare and were succeeded by coordinated operations of large air units against important objectives as the war continued.

The Germans were the only ones to develop a special airplane for attack missions. The first was the Junkers-Fokker all-metal Schlachtflugzeuge (attack airplane) of 1917 and was superseded by the Hanoveraner and the Halberstadt CL types armed with two supplementary machine guns firing through the floor at an angle of 45 degrees toward the front. These in turn were superseded just before the Armistice by the Junkers-Fokker CL-1, a very fast and maneuverable all-metal monoplane, with the vital parts of the power plant and the occupants protected with light armor.

Used Effectively in World War

Several disastrous attacks made by airplanes on ground troops are worthy of note. On September 6, 1917, a squadron of twenty-four German Halberstadts, covering the withdrawal of their own troops from the town of Peronne, caught an advancing British division crowding two bridges which crossed the Somme at Brie and St. Christ. The British artillery and lorries suffered heavy losses, the troops were in confustion and the entire division paralyzed, and the German infantry had time to consolidate the postion to which it had withdrawn. Again, in the Allied drives against the Western front, over 300 of the 1,000 German defending airplanes were used as attack planes. On March 21, 22 and 23, 1918, with German pursuit dominating the air, these 300 planes operated against the British Fifth Army, which crumpled under the blow, and chaos reigned in the streets of Noyon, Guisard, Ham, Chauny and Peronne. By March 24, Allied reinforcing air units had evened matters and for the next few days bombed German airdromes and reserves, which slowed down the German counter-drive. In the Germans' attack on Armentieres on April 9, 1918, both the Germans and the British used attack aviation, but the former, surprisingly, lacked preparation, while the British operated according to careful plan, and Ludendorff, checked by the very weapon he had so vigorously fostered, stopped his attack on April 19.

On July 15-20, 1918, French attack aviation destroyed three-quarters of the bridge material of the German Seventh Army on the Marne. On August 8, 1918, the British, after a week's rehearsal, used attack aviation so effectively, and their previously drawn-up plan of operations worked so well on the Amiens front, that the German troops were thrown into confusion, and 13,000 of them were later taken prisoners. The American Air Service, largely trained along French lines and short of suitable equipment, used attack aviation but little. On the Palestine

Curtiss "Falcon" A-3, present standard attack plane of the U. S. Army Air Corps front, attack aviation was used by both Germans and British from 1916 on.

The most striking use of attack aviation was when the British in September, 1918, completely disorganized the already retreating Turkish Seventh Army and caused the Eighth Army to surrender. Two squadrons of Bristol Fighters and D.H. 9's were responsible for this Turkish rout.

Since the World War, attack aviation has been used chiefly against troops which were poorly organized and had no air force. Some of these instances were the British in North Russia in 1919; Russo-Polish War, 1919-1921; British in Mesopotamia, India, Soudan and Somaliland; French and Spanish in Morocco, Italy in Tripolitania, Dutch in East Indies in 1928-1929, and U. S. Marines in Nicaragua. Here the dual use has been made of observation airplanes. Except for the Russo-Polish War, the above-named conflicts may be termed "bush-warfare."

From World War experience we have learned that attack aviation should seldom be used in lieu of artillery or machine gun fire, but to extend the range of the artillery and the machine gun. It should seldom be used, if ever, against the front lines of the enemy, and its use is at present contemplated at from 25 to 120 miles into enemy territory, although extra fuel supply will send it as far as 180 miles past its lines. It should be sent after definite targets, instead of relying upon it to encounter "targets of opportunity" or such targets as might come into view if the attack formation were roving around inside the enemy lines.

Other Effective Uses

Attack aviation, in its use to destroy enemy airdromes with airplanes parked thereon, has taken one job away from its own pursuit, and it is certainly more profitable to strike the enemy airplanes on the ground than in the air, where they may fight back. It has increased the chances of success of bombardment by supporting its own bombers in a raid and destroying or neutralizing anti-aircraft establishments a few minutes before the bombers appear on the scene. An adequate amount of attack aviation will force the enemy ground troops to move at night, with all the usual slowness and other disadvantages of nocturnal marches where lights must be kept out. Even here attack aviation will hold forth, for its use is also contemplated at night, operating just above a line or group of previously dropped parachute flares, which show up the enemy and blind them, preventing them from seeing the attack planes flying on the other side and above the brilliant flares. Attack aviation will also be used against sensitive points in enemy communication lines.

In the most spectacular use of attack aviation, that of the strafing of troops on the march, a squadron would split up into nine-plane flights, with each flight attacking a battalion, the squadron therefore taking care of a regiment. Fragmentation bombs, weighing about 25 pounds, and machine gun fire are used. The modern attack plane carries from 10 to 20 such bombs and six machine guns, four pointing forward and two on flexible mounts, operated by the gunner in the rear seat. The latter are for defense against hostile aircraft only.

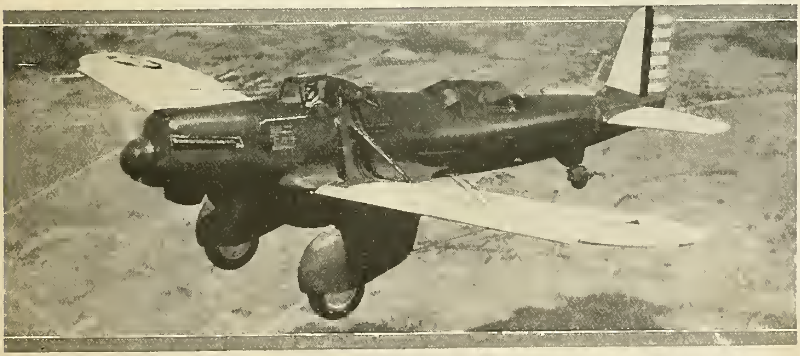
The Army Air Corps' present standard type of attack airplane is the Curtiss Falcon A-3. For the past year and a half it has been toppling from its throne, but development work on its successor, the Curtiss A-8, a low-wing monoplane with slots and flaps and a 600-horsepower prestone-cooled engine, has been slow, and the A-8 has not yet been adopted as a standard type. At this writing about a dozen airplanes of this model are undergoing service tests by the Third Attack Group at Fort Crockett, Tex., and two are undergoing experimental tests at the Materiel Division at Wright Feld.

Those in charge of military aviation in other countries think somewhat as we do concerning the employment of ground-strafing aviation but differently concerning its relative importance in the air force scheme. Holland and Russia have made it a specialized type of military aviation. In some foreign circles it is felt that pursuit aviation, or light bombardment, can be diverted when need be to perform attack missions; or that such fighting aircraft as are available are more valuable in clearing the air of all hostile aviation, allowing friendly aviation full sway and furthering the "air aim." The occasions upon which attack aviation may be employed are comparatively rare, especially in a major war, is the conclusion of certain other powers, and while they admit the increased efficiency of a specially designed airplane for attack missions, they feel it is more advantageous to have a dual-purpose airplane such as pursuit or light bombardment which may be always available for missions. All the larger nations, however, have worked out various schemes for the employment of military airplanes in what we call "attack missions."

We differ with most of them, then, in our conception of what the war of the future will be like. Attack aviation is to be used at night as well as in the daytime, and against anti-aircraft establishments in support of friendly bombardment; and against troops in bivouac and sensitive communication points as well as against troops on the march. The Air Corps, therefore, visualizes few instances in which attack units would be kept on the ground because there is no work for them to do.

Hence our Army Air Corps has its attack aviation.

Two nine-plane groups of "Falcons" practising ground strafing maneuvers


Curtiss A-8 "Shrike" attack monoplane, possible successor to the "Falcon" A-3

Notes on Take-Off Calculations

PART 2

DR. MICHAEL WATTER

● The problem of take-off analysis was outlined in a general manner in the first part of this article last month, which also dealt with the take-off of sea planes. This part of the article covers the run and time required for landplane take-off as well as the simplified propeller data necessary in connection with these analyses.

LANDPLANES

Calculation of Resistance

Difficulties encountered in calculating the take-off of seaplanes, to a great extent, do not exist in the case of landplanes, since even a comparatively large error in assigning the rolling coefficient of friction has but little effect on the final answer.

The attitude curve is decided upon by the nature and purpose of take-off and is different, depending on whether the shortest run, clearing of a given obstacle or some other condition may be a deciding factor.

Once the attitude curve is drawn, it is possible to calculate and plot the lift and drag of the airplane. The take-off speed, as before, is assumed to be 10% higher than the stalling speed of the airplane.

Knowing the lifts, we may plot the curve of unsustained weights which are equal to the difference between the gross weight and lifts. The rolling resistance is obtained by multiplying the unsustained weight at each speed by the assumed coefficient of friction.

The coefficient of friction is referred to here as a coefficient of rolling resistance, because even in the case of an airplane equipped with a tail skid it is assumed that the pilot will raise the tail of the plane as soon as he starts the take-off run. The magnitude of the coefficient is greatly affected by the nature of the runway and varies from a minimum of .015 to a maximum of about .15. For a good, dry, grass-grown field or a closely-packed cinder-covered runway, Warner suggests the use of .03 as a good average value. Adding the rolling and air resistance, we obtain the total resistance at each speed.

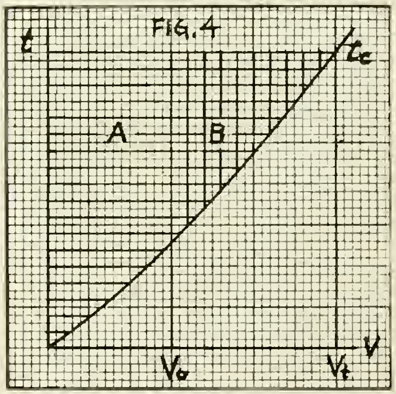
Excess Thrusts, Accelerations, Time and Length of Take-Off Run

Having determined the total resistance and thrust, we proceed as before by calculating the excess thrusts and accelerations. In this case, however, the mass to be accelerated is obtained by dividing the gross weight by the acceleration of gravity: $g = 32.2$ ft./sec.^{2}

Having the curve of accelerations versus speed, we tabulate the calculations of time and distance in the form of tables 2 and 3 (see Part 1 of this article) and plot the results.

Effect of Wind

Since in the case of a landplane all the factors entering into the problem of take-off are functions of the air speed only, we may make a useful observation on the take-off into the wind.



Due to the fact that the ground speed does not affect the lift and consequently the resistance, the curves as prepared for the calculation of take-off in calm can be considered as plotted against air speed.

Given the magnitude of the wind, we draw a vertical line through it until it intersects the time curve, and considering the point thus obtained as the origin of the time curve, proceed as before to obtain the length of the take-off run. In figure 4, area A gives the length of the run in calm, while area B gives the length of the run into the wind, Vo.

Available Propeller Thrust

It was pointed out before that the determination of the magnitude of thrusts constitutes an important phase of the take-off problem.

In view of the general use of the adjustable metal propellers using standard type blades, a few simplified formulas will be included to obviate the necessity for using charts for preliminary calculations. The formulas given here are based on the N.A.C.A. No. T.R. 350 and will be found useful in preliminary performance and take-off analyses.

It must be remembered, however, that the range of applicability is limited to metal propellers geometrically similar or closely approximating blades used for the N.A.C.A. tests presented in the above report. They are not applicable to a wide-blade propeller, such as may be produced by cutting off the tip of a standard blade, in which case the actual test data must be resorted to.

Since most airplanes, except in special instances, are equipped with propellers for average service conditions, the formulas covering the peak efficiency propellers will be given here.

(*Continued on page 58*)

TABLE 4

Jm	α°	Cm	ηm
.2	8	.61	.51
.3	10	.765	.61
.4	12	.92	.673
.5	14	1.075	.72
.6	16	1.23	.755
.7	18	1.385	.783
.8	20	1.54	.805
.9	22	1.695	.822
1.0	24	1.85	.837
1.1	26	2.05	.853

TABLE 5

J/Jm	η/ηm
0	0
.1	.18
.2	.34
.3	.50
.4	.61
.5	.72
.6	.82
.7	.89
.8	.94
.9	.98
1.0	1.00

TABLE 6

J/Jm	Cs/Csm
0	0
.1	.094
.2	.188
.3	.279
.4	.372
.5	.466
.6	.565
.7	.665
.8	.771
.9	.884
1.0	1.000

TABLE 7

J/Jm	n/nm
0	.83
.1	.83
.2	.83
.3	.83
.4	.83
.5	.83
.6	.84
.7	.85
.8	.89
.9	.94
1.0	1.00

Hiram Bingham's N. A. A.

CY CALDWELL

The contempt in which the N. A. A. is held by the majority of pilots is due solely to the policies of Hiram Bingham, whose latest intolerable ruling violates every consideration of justice. The governors and members of the N. A. A. should oust this old politician from the presidency of their association, which, through his maladministration, has fallen into disrepute. The voters of Connecticut, Hiram Bingham's own state, removed him from the Senate. The members of the N. A. A. should retire him from aviation.

● For lo these many years my friend Frank A. Tichenor, the doughty publisher of AERO DIGEST, has been hammering away at former Senator Hiram Bingham, President and virtual dictator of the National Aeronautic Association. In this Seven Years' War I have until now remained practically neutral, though on occasion I have hurled a good-natured gibe in Mr. Bingham's direction. The reason that I have refrained from commenting seriously on Mr. Bingham and his activities is because I agree with Senator Blaine of Wisconsin, who remarked of Bingham, "Why, the Senator from Connecticut is just a frail bark upon the ocean of life and I do not believe it is necessary to discuss him. It is not necessary to exaggerate his unimportance."

So far as I am concerned, I would be content to let this frail bark sail forever unmolested upon the ocean of life, for personally I hold nothing against him. As a private citizen to meet casually at air races, I even like him. I accept him cheerfully for what he is—a wily old politician who on numerous occasions has afforded me cause for merriment. It is as President of the N. A. A. that I object to him. For many years my objections were founded on no stronger grounds than I would have against my dear old Aunt Agatha. Frankly, I don't think Aunt Agatha would make a good President of the N. A. A., and I know from long experience that Hiram Bingham doesn't, either.

But since Nov. 4, 1929, my objections have been founded also upon the fact that his Senatorial actions were such that his fellow-members in the United States Senate were forced to censure and condemn them. And in thirty years Hiram Bingham was the only Senator censured and condemned by his fellow-members. In fact, there have been only three cases of Senatorial censure in America's history. The first was in 1844; the second was in 1902. Hiram Bingham was the third and last in 1929.

Senate's Opinion of Bingham

After scathing denunciation of Hiram Bingham in public hearings, here is the final verdict, quoted from the Congressional record: "Resolved, That the action of the Senator from Connecticut, Mr. Bingham, * * * while not the result of corrupt motives on the part of the Senator from Connecticut, is CONTRARY TO GOOD MORALS and SENATORIAL ETHICS and TENDS TO BRING THE SENATE INTO DISHONOR AND DISREPUTE, and SUCH CONDUCT IS HEREBY CONDEMNED."

That a man deserving such censure still remains President of the N. A. A. is matter for wonder and is explainable only by the somnolence and inertia of the members of that peculiar body. However, while I would not for a moment tolerate such a man as Bingham as President of any association of which I was a member (for either that man or I would resign from the association), yet I was not inclined to stir up the N. A. A. membership against Bingham. If he still suited them, well and good, so far as I was concerned—no people deserve a better leader than they are content to put up with. The N. A. A. being what it was, Bingham served them right.

Misuse of Power

It occurs to me here that some who do not know me personally may wonder if my objection to the N. A. A. and its President is founded in part on the fact that I am not a member, and therefore am jealous of the eminence possibly accorded one who is a member. I have been asked to become a member three times during the past year, and each time I refused the doubtful honor. Hiram Bingham personally invited me to join the Contest Committee, while we were at the National Air Races last September, and again invited me by letter after his return to Washington. Again a month ago the Hon. Wm. P. MacCracken, Jr., now Chairman of the Contest Committee, also invited me to join his Committee, and I again refused. Incidentally, if Bill MacCracken was President of the N. A. A., and Hiram Bingham was out of it, I should feel honored by a position on the Contest Committee. But it would be a vastly different committee and a different N. A. A., with policies entirely changed.

It is because of those policies of Bingham's that Amelia Earhart recently resigned from the Vice Presidency of the N. A. A. Like many other good aviation people, Miss Earhart joined the N. A. A. in order to help aviation, on which it is affixed like a wen. But she found, as others have found, that Bingham, through a non-attending board of Governors, is able to control not only the N. A. A. as a whole, but the Contest Committee as well. When she finally learned this fact, which has been known to me for seven years, Miss Earhart resigned in disgust. She refused to function as a rubber stamp for Bingham and his gang.

Now, I am a very tolerant and easy-going individual; it takes much to raise my wrath. For years I have regarded Bingham and his N. A. A. with good-natured contempt; they didn't do much good, but they didn't do much harm, so I was content to live and let live. But when Hiram Bingham misuses his dictatorial powers to deprive racing pilots of the right to make a living for any such unreasonable period of time as three years, it is time for me to cast aside my normal kindly toleration and to gird myself for the fray. I now declare war upon Hiram Bingham and his gang and will not rest content until I have driven them from the N. A. A. or else have removed from the N. A. A. their authority from the International Aeronautical Federation, termed the F. A. I., and have it transferred to a worthy body.

Bingham's Vicious Policies

In the July Air Race number of AERO DIGEST I shall discuss the N. A. A.'s proper and improper control of and penalizing of pilots engaged in competition, and other matters regarding the races, so now I shall merely state that, while control by some official body is essential,

(*Continued on page 60*)

• EDITORIALS •

"On the technical side of this business, the greatest advances are going to be made within the next few years with instrument flying. Our service at the present time, so far as performance is concerned, is not one hundred per cent reliable. Our company takes the position that we are proud of the miles we do not fly with passengers. That is to say, we do not fly them when weather conditions are unfavorable."—R. W. ROBBINS, Pres., T. & W. A.

Balance Your Budget

• From the outset of drastic reduction of Government expenditure with the sole objective of balancing the Federal budget, it was apparent that this business called flying would have to take its fair share of curtailment in Government support. However, there were some groups in our industry who consistently refused to believe that any soft-hearted government at Washington would be that "cruel."

They permitted the process of deflation to take its natural course, believing that at the very last there always would be the cushion of a government contract.

It has become axiomatic to claim that a new science (and one of such fundamental importance as ours) is entitled to the help of at least indirect Government subsidy. It is hard to make any set of figures prove that air transportation, plane and engine manufacturing, sensibly conducted always with an eye to future improvements, could be done at a profit without some Federal aid. Even in the light of the most drastic Government economy the truth of this has remained.

Recognizing that truth is one thing; being content to drift in the belief that the help of a generous Government would not only continue forever, but might be expected to increase through the years, is quite another thing.

We must warn those companies adhering to the latter policy that they have a responsibility to their investors and stockholders which cannot be ignored. There is a way out for the aeronautical industry. As the tide begins to turn, a few of the more energetic companies are proving this. Even if we knew the secret in each of these few successful cases, we would not presume to divulge it. But it is a safe bet that turning red figures into black has not been done in these cases through another visit to the Treasury.

110 Miles an Hour by Rail

• One of the large railroads announces that it has authorized the purchase of a new type of three-unit train capable of a speed of 110 miles an hour.

It would be reassuring, indeed, if the aeronautical industry, pointing to the top speed of its fastest type of equipment, could call such a speed laughable. Such, unfortunately, is not the case. It is true that all branches of flying have consistently pushed back the limits both of top and cruising speeds, but in this latest advance of the railroads a lot of ground has been recaptured by the rail people. The truth in the situation is obvious. If it had not been for the great strides made by flying in recent years in the realm of speed, the railroads never would have bestirred themselves.

A few years ago, railroads, at considerable expense, began air conditioning of trains. It is no secret that this consideration of passenger comfort was forced upon the railroads by the comfort arguments of the airlines. Those promises were not in all cases fulfilled. Airlines still have much work to do in the matter of making air travel more comfortable. The railroads probably never will catch up with the airlines in the matter of speed, but a consistent improvement in speed combined with comfort in travel, unless airlines look to their laurels, will keep much profitable traffic out of the air for a long time.

A Lesson from the Italians

• The men in Italian aviation are teaching a lesson which the rest of us can well afford to study. In the currently planned activities of a number of Italian fliers we see no tendency to be content with the records and the achievements of yesteryear. Under the leadership of General Italo Balbo, a squadron of seaplanes is scheduled to leave Italy this month to attend A Century of Progress Exposition at Chicago. This is not only going places, it is going places in numbers, a feat in which General Balbo and his compatriots have demonstrated in the past their expertness. Fleet movement through the air is a more difficult undertaking than a one-plane flight, however spectacular the latter may be. There are many lessons to be learned from a squadron flight such as the Italians plan. The weakest unit becomes the important factor. If that unit is sufficiently weak, the entire undertaking may have to be listed as a failure. For full success there can be no weak link. Flight planning and organization, in which the Italians have proved themselves masters, becomes the highly important factor. General Balbo is not a stranger in this country. He will be welcomed here by many old friends.

At the same time another colorful Italian veteran of the air, General De Pinedo, is planning to win for Italian aviation the world's endurance record. In applauding DePinedo's latest ambition, we compliment him upon coming to America for his flying equipment.

Our salutations to the Italians!

The F.A.I., N.A.A. and A.A.A.

• Paramount in the present wave of doubt concerning the usefulness of the supervisory and regulatory bodies in aeronautics is the primary function of giving sanctions. All races and all meets should be sanctioned, and we do not believe that many reputable members of the flying profession feel otherwise. It is the practice of turning the sanctioning privilege into a racket by which the regulatory organization is supported by sanction fees which is causing discontent.

Those racers and other automotive men who willingly submit to the supervision of the American Automobile Association have not been subjected thereby to any exorbitant taxation for sanction, or any of the complicated red tape which the F.A.I. and N.A.A. have imposed in the case of aeronautical meets.

The racket of the heavy fee must go. The abuse of this high-priced privilege by threatening to withhold sanction must be abolished. If this is not done, it is not inconceivable that fliers, envying the smooth functioning of the A.A.A., and willing always to submit to fair supervision, might see the desirability of placing themselves under the regulation and supervision of the A.A.A. with a special representative appointed from the field of aeronautics to look after fliers' interests.

And when that day comes, perhaps we will have an air meet as smoothly run as the annual Indianapolis automobile event.

The fee for this race under A.A.A sanction is $1,000. The race grosses from $200,000 to $400,000. The fee paid for the National Air Races, under F.A.I. sanction, controlled by Bingham's N.A.A., has been as high as $25,000—$12,500—or whatever he can get. The original N.A.A. incorporators formed that organization to help promote aviation. Under Bingham it is still promoting—but what?

Personairlities

by Caldwell

• FOR THE celebration of the sixty-fifth birthday of Wilbur Wright and the thirtieth anniversary of the first flight by the Wright brothers, a memorial flight will leave Dayton, Ohio, about the middle of June, carrying 150 pounds of mail which will be postmarked in each of the fourteen countries where stops are made. The plane is a Wasp-powered Bellanca, and the crew consists of Larry Ruch, pilot, and Lewis F. Green, navigator and radio operator. The itinerary of the flight is as follows: Dayton to Washington, New York, Harbor Grace, Dublin, London, Paris, Berlin, Prague, Vienna, Rome, Madrid; Rabat, Morocco; Freetown, Africa; Natal, Brazil; Caracas, Venezuela; Havana, Cuba, and return to Dayton. I hope they make it.

Now, the real beginning of this flight across fourteen countries that I'd enjoy flying over myself, and across two large, wet oceans that I wouldn't cross except on a large, wet ocean liner, began (so far as the pilot is concerned) on August 15, 1903, in a doleful burg named Dorrance, Kans. The parents of this infant looked him over—whether with or without enthusiasm the record does not state—and in the hope of clothing him with a little dignity had him baptized Laurence Donald Ruch. This name long since has fallen into the discard, for the infant gradually grew up under the nickname of Larry Ruch, and the rest has been forgotten. So it is as Larry Ruch that he will make his bid for fame with the assistance of one Bellanca, one Wasp and one Green. I hope that all four function well, especially while crossing those oceans. As an old pilot who has crossed small sections of two oceans and has fallen, complete with Loening amphibion, in one large lake, I look askance at all water crossings.

Larry Ruch

Larry received his education in Kansas and learned that Carrie Nation is a major saint and Charles Darwin a major sinner; that still is being taught in Kansas, to the complete satisfaction of Kansas and the amused interest of the rest of the country. Larry attended Friends University in Wichita, in 1922, and the following year joined the Army for a year in Hawaii. In 1924 he was a cadet at Brooks Field, Tex., in the class with Charles A. Lindbergh. Escaping from Brooks Field, Larry secured a Standard OX-5 through the combined financial assistance of all his friends and started out to see the world. He barnstormed through the Middle West, for a time was with R. Carter Harrison's Flying Service (formerly Garver's Flying Circus), then he worked for the Swallow Co. at Wichita, and later joined the Arrow Aircraft Corp. at Havelock, Neb., as chief test pilot, and barnstormed in Texas and New Mexico, demonstrating and occasionally selling Arrow Fives.

Test-Hops 500 Eagles

In 1927 he became chief test pilot of the American Eagle Aircraft Corp. at Kansas City and came under the elevating influence of Ed Porterfield, one of the Great Air Moguls of those parts and those times. Ed also ran the Porterfield Flying School, affiliated with the factory, and Larry Ruch served as chief flight instructor for the school. Larry has test-flown 500 American Eagles in the days of their glory and probably has more time on Eagles than any other pilot. He left the American Eagles in their nest on Fairfax Airport in Kansas City and came to New York in 1930 to fly for an individual who lived on Staten Island and commuted between there and Texas and the West Coast by air. Larry was commissioned an ensign in the aviation branch of the Naval Reserve in 1930 and while in New York was associated with Navy Reserve Squadron VN3-RD3 at Floyd Bennett Field. He was appointed a naval aviator in 1932, but he still can't explain why the Navy finds it necessary to give their squadrons any such involved designation as VN3-RD3; nor can anyone else below the rank of admiral. Worn out trying to solve this puzzle, Larry left New York for Dayton last March to supervise the reconstruction of the Bellanca, making the necessary changes for this long Wright Memorial Flight, on which I hope all good fortune attends. As not only his friends but many air mail cover collectors will be interested in this flight, they may want to write to him, at Box 105, G. P. O., Staten Island, N. Y.

* * *

• SINCE 1931 Charles H. (Carl) Dolan has been operations manager of Eastern Air Transport, Inc., with headquarters at Candler Field, Hapeville (Atlanta), Ga. He admits that Eastern Air isn't the longest airline in the world, but he reminds me that it's as wide as any. Where he was born, and why, I haven't the least idea, but long research discloses that in 1913 he worked with Professor Andrews of Massachusetts Institute of Technology, checking Professor Eiffel's work on wing efficiency, and making models for Boston Tech wind tunnel. 1914 and '15 finds Dolan working and checking in England as assistant chief inspector of British-Thompson-Houston Co. and the first aviation magnetos made in England, and also on a bombing device. If this was the device I used in the war, it was no good, without further checking. I'd guarantee anyone using it would miss every target, and finally just look over the side and let them go, as we all did after a few puzzled glances through the device.

Chas. H. Dolan

Mr. Dolan, the careful checker, also worked for S. Smith and Sons as chief inspector of aeronautical instruments. Up to this time he had inspected various mechanical attachments of the war but had remained neutral himself. The United States was being neutral with Woodrow when Dolan went to France for the Sperry Gyroscope Co. as installing engineer in charge of Paris shops on the automatic gyroscopic stabilizer. If these stabilizers had been attached to our own simple and wobbly politicians, we'd have remained neutral and saved ourselves billions of uncollectable debts; but there's no use crying over spilt Liberty Loans and the war fevers of politicians who never do any fighting themselves.

Paris in wartime was a dangerous place for a young inspector; in fact, it proved the end of him as an inspector, for the first thing his friends heard was that he had joined the French Foreign Legion, had been detached to aviation, and graduated from the following schools: Bleriot Primary School, Nieuport Perfection School, Pau School of Aerial Combat, and Plessis Belleville School of Combat, on Spads.

Ready for the Front!

Packed with flying knowledge, checked and double checked, Dolan departed for the front with the Lafayette Escadrille and went though nine battles, with Major R. Lufbery and Colonel William Thaw commanding. On Nov. 17, 1917, he was commissioned 1st Lieut., U. S. A. Air Service at the Front, and went through two battles under the command of Captain Robert Rockwell. He held every job in a squadron from pilot to commanding officer, and has been at different times a Flight Commander, Operations Officer, Supply Officer and Engineer Officer. In fact, he's been about everything in a squadron but Mess Sergeant, which is the only job that's really worth having in any squadron—especially in an English squadron, where it is the happy custom to issue rum rations. As a patriotic English sergeant remarked, "I care not who commands my country's squadrons; only let me handle the rum rations." Or words to that effect.

Anyhow, not being a Mess Sergeant, Carl Dolan saw no use in staying over there after hostilities ceased, so in 1918 he returned to the States. And just to prove to him that he'd been a trifle precipitate in leaving a land where good wine was only a few francs a bottle, the Army sent him to Carlstrom and Dorr Fields, Fla. The high point of his life now had been reached and passed. What follows is mere static. They put him on the Control Board in charge of systems of training and made him Engineer Officer in charge of what had been, at the height of hostilities, $5,000,000 worth of equipment, but now wasn't much of anything but stuff needing storage until some trusting soul bought it "in the original crates," a phrase that has now passed out of the language.

During 1919 and '20 Dolan was stationed at Office of Director of Air Service in Washington, Information Group, in charge of collecting and disseminating aero information from all parts of the civilized world, including Germany, for at that time Hitler still was a house painter. In all, Dolan collected some 78 cents' worth of information, and resigned from the Army in May, 1921, to go to China as Instructor and Adviser to what was humorously known as the Chinese Air Service. Whether or not he advised the Chinese to avoid all flying Japanese, I don't know, but someone must have advocated that plan, for to date no Chinaman has even met a Japanese war pilot in the air. Dolan received three decorations while he was in China—the Chop Suey Cross, with palms; the Grand Order of Chow Mein, with noodles, and the Distinguished Service Order of Bird's Nest Soup, with rice. A report states that at the Great Wall he saved the life of Secretary of War Denby. Why, nobody knows. Just an unthinking impulse, I suppose. Imagine saving a Secretary of War!

To live this error down, Dolan moved to Hawaii, made an aviation survey, was a member of various commissions to boost aviation in Hawaii, and in 1929 returned to the States to make a tour of the airlines and surveys of aviation activities. He was still checking up. It was almost inevitable that he should become vice president in charge of operations of E. A. T., where we will leave him sitting on Candler Field, one of the few approximately level pieces of ground in that part of Georgia. It is the only airport I know of with its own subway running around one end of it. It used to be an old race track, and they had to dig a subway through a hill or the races would have had to be run with the horses going up and down, as on a roller coaster. When it became an airport, the odd airplane used to drop into this subway, greatly to the amusement of bystanders. I suppose they've filled it up by now. If they haven't, it would be a good safe place for the Chinese Air Force to park until the war is over. But perhaps they're in a good subway over in China; so far as I know, they're not in the air. I wonder just what instructions Mr. Dolan gave them, anyhow?

* * *

• YOU SIX readers doubtless have wondered how I learn intimate details about pilots scattered over all parts of the civilized world, and even in Hollywood. Well, I'll tell you: I have built up through the years one of the largest and most disreputable organizations of its kind in the country—the Caldwell Secret Service and Deplorable Details Corp. I have operatives scattered around the various states with notebooks and cameras, hiding behind hedges, fences, whiskers and other places of concealment, ready to spring upon the unsuspecting pilot and put him through the fourth degree, which is one degree more devastating than the third degree.

One of the largest and most notorious of these operatives is K 57, sole survivor of the Wreck of the Old 97. He is now in Hollywood, heavily disguised as Jerry McClelland, a lighting expert; though as he hasn't sold any lights, people are beginning to suspect him for what he is—one of the keenest, most relentless and untiring detectives ever engaged in the business of searching for prosperity, which constantly eludes him as it does the rest of us. Asked recently what he was doing in Hollywood, Operative K 57 replied through his teeth, "I am the Fuller Brush man." This remark saved him from further questioning, though not from a damaged whisk-broom that someone bounced off his head.

W. E. Carey

In a recent report good old K 57 sends me particulars about this fellow masquerading as a Mexican *vaquero*, or *hacienda*, or *tamale*, or whatever it is you call a Mexican who hops on a horse and rides off rapidly in all directions. It seems he isn't a Mexican at all, but Pilot Warren E. Carey, aviation representative of the Union Oil Co. of California. Now that just goes to show the effect of a pilot's living next door to the movies—he puts on a costume and does an act. I don't know whether he's ever been on a cow pony or not, but I'll bet if you led him up to one and shouted, "To horse! To horse!" he wouldn't know which side of the animal to climb up. Jerry McClelland, for instance, usually has his picture taken with a cowboy's ten-gallon hat on his head; and I happen to know he doesn't ride horses, because they haven't raised any horses strong enough to carry that weight. Elephants, yes; but horses, no. If Jerry wants to look convincing as a friend of the animals, he should disguise himself as a mahout.

Well, this Hollywood horseman, Warren Carey, was born Jan. 29, 1896, or so he was told, for, like the rest of us, that's one important event in his life he has to take entirely on hearsay. This dire happening occurred in the rising town of Urbana, Ohio, which finally rose enough to shake him off after he'd battled his way through the grade schools, eluding what education he could. In spite of his resistance to learning, however, more of it was poured into him in the Ohio High School at Springfield, Ohio. They got him graduated, somehow or other, in 1914, and then sent him to Ohio Northern University to study mechanical engineering.

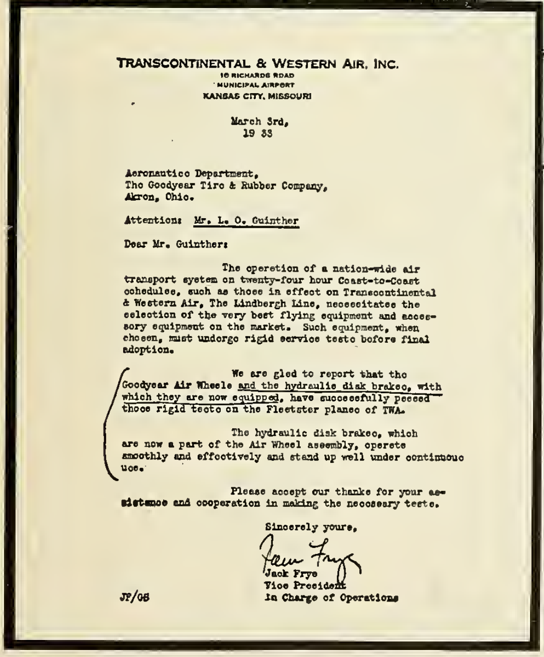
It took a major war to get him out of Ohio, for after three years at the uni-

(*Continued on page 56*)

First came the AIRWHEEL
Then came the internal expanding AIRWHEEL BRAKE
NOW comes
the **FIRST HYDRAULIC BRAKE** originated for Airplanes

oil pressure required
operated band brakes
This new Goodyear brake unit consists of
alternate discs of bronze and steel — long-
wearing and easy to replace. The unit com-
favorably in weight with other type

They certainly CLICKED WITH TWA



TRANSCONTINENTAL & WESTERN AIR, INC.
10 RICHARDS ROAD
MUNICIPAL AIRPORT
KANSAS CITY, MISSOURI

March 3rd,
1933

Aeronautics Department,
The Goodyear Tire & Rubber Company,
Akron, Ohio.

Attention: Mr. L. O. Guinther

Dear Mr. Guinther:

The operation of a nation-wide air transport system on twenty-four hour Coast-to-Coast schedules, such as those in effect on Transcontinental & Western Air, The Lindbergh Line, necessitates the selection of the very best flying equipment and accessory equipment on the market. Such equipment, when chosen, must undergo rigid service tests before final adoption.

We are glad to report that the Goodyear Air Wheels and the hydraulic disk brakes, with which they are now equipped, have successfully passed those rigid tests on the Fleetster planes of TWA.

The hydraulic disk brakes, which are now a part of the Air Wheel assembly, operate smoothly and effectively and stand up well under continuous use.

Please accept our thanks for your assistance and cooperation in making the necessary tests.

Sincerely yours,

Jack Frye
Jack Frye
Vice President
In Charge of Operations

JF/GS

● Before the first public announcement, Goodyear's new Hydraulic Brakes for Airplanes had passed the tests of Transcontinental & Western Air, Inc. and were in service on the Fleetser planes of TWA.

Read the letter and see why transport systems operating on twenty-four hour schedules like these brakes which deliver—

400% more braking area than a comparable size band type brake provides—

95% of the power applied to the brake pedal delivered to the brake unit—

Operation with approximately 25% of the oil pressure needed for hydraulically operated band brakes—

Smoothness—reserve power—non-fading—instantaneous release at all times!

Get the complete details about these new brakes, built of alternate discs of bronze and steel—long-wearing, easy to replace. Write to Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

THE GREATEST NAME IN RUBBER

GOODYEAR

WHEN YOU BUY A NEW SHIP SPECIFY THE NEW GOODYEAR BRAKE

AT THE AIRPORTS

New York City Seaplane Terminal

ON JUNE 15 an air terminal will open on the Hudson River, directly across from downtown New York City, according to the Marine-Air Transport Co., sponsor of the project. The terminal, known as the Metropolitan Seaplane Terminal, is to be located at Pier B, Exchange Place, Jersey City, N. J. All central points in the metropolitan New York area and Newark can be reached in a few minutes. The Holland Tunnel is only five minutes from the terminal, thus enabling those using the terminal to reach it by car in about eight minutes from the New York side of the Hudson. Cars will be able to drive directly to the outer end of Pier B, where the seadrome, offices and waiting rooms are located. Newark Airport is less than fifteen minutes from the terminal, so that any transport line can carry its passengers to the airport via the new express highway, for transfer to airlines running out of Newark to points west and points not reached by transport lines using the terminal.

A waiting room furnished in nautical style, an observation deck and offices for the Marine-Air Transport Co., who will operate the terminal, will be on a seadrome, 164 feet long. Offices are also being provided for the Maine Air Transport Co., who plan to operate Fairchild seaplanes between the terminal and Nantucket, Mass., as well as to other points. Offices for additional operators will also be made available.

A roof over the seadrome, 100 feet long, will cover the ships of the various operators, as well as the planes of private owners. Emergency repairs can be made out of water, and on the deck of the seadrome mooring space will also be available so that planes will be able to remain moored at the terminal during the day or night. Gas, oil and service will also be available.

A ramp, thirty feet wide, having a turn-table in the center of it, will extend from the deck of the seadrome into the water, and is to be located out of the river current. An incoming plane will come directly to the ramp, where it will be immediately pulled and fastened to the center of the turn-table on the ramp. As soon as the ship is fastened, the end of the ramp extending into the water will rise, until it is completely out of the water and level with the deck of the seadrome. The ship will then be swung around, by means of the turn-table, until the exit side of the ship is facing the waiting room. The passengers will then be in a position to disembark directly onto the deck and walk but a few feet into the waiting room. After the incoming passengers are discharged and the outgoing passengers enter the plane, the ship will be swung around, headed toward the outer end of the ramp, which is then to be lowered, leaving the plane in a position to proceed immediately. Ships loading or unloading passengers will be allowed to remain on the ramp only until their passengers are loaded or unloaded, so that the ramp can be kept clear.

Air Races at Findlay, Ohio, Airport

THE FINDLAY Air Races will be held at the Findlay Airport, Findlay, Ohio, July 4 under the auspices of the North Baltimore Flying Club, the Ohio Oil Co. and the Findlay Chamber of Commerce. The flying club, under the management of Carl E. Doyle and W. M. Lafferty, have promoted air meets at North Baltimore for the past two years. The program this year includes formation flying, aerobatics, races for airplanes using OX-5 engines and for planes using engines of 100 horsepower or less, parachute jumps and bomb-dropping and precision-landing contests. Cash prizes will be awarded to first-, second- and third-place winners in each event.

The Findlay Airport, formerly the Rummel Airport, was recently leased by the Ohio Oil Co. for ten years. Plans are being made for the improvement of the airport, and work has begun on grading and leveling the field. Two main runways will be constructed, 2,100 and 2,400 feet long, in the form of an X, with a taxi strip connecting them. Airport buildings will be remodeled and an airport fence erected. Forty acres owned by the oil company and adjoining the field will be added, giving the airport a total of 160 acres. The airport is a Department of Commerce approved repair station, and service facilities will be improved and under the management of Harry Rummel.

Trans-Atlantic Flight Preparations

AS THIS ISSUE of AERO DIGEST was going to press, four planes were being made ready at Floyd Bennett Field, Brooklyn, N. Y., for trans-Atlantic flights, awaiting reports of favorable weather. These were General Francesco de Pinedo's special Bellanca, *Santa Lucia,* which is prepared for an attempt at the long-distance flight record in the direction of Bushire, Persia; Capt. Cesare Sabelli's Bellanca monoplane, *Leonardo Da Vinci,* which is reported to be intended for a flight to Rome; the remodeled Bellanca, *Lituanica,* of Capt. Stephen Darius and Stanley Girenas, Lithuanian fliers, who plan to fly to Lithuania, and James Mattern's rebuilt Lockheed, *Century of Progress,* which is to make a second attempt at the 'round-the-world speed record. Authentic details regarding the proposed flights were unavailable.

Airline to Erect Hangar at Des Moines

BOEING Air Transport, Inc., was to start construction of a $30,000 hangar at the Des Moines Municipal Airport last month, according to an announcement by D. B. Colyer, vice president and manager of operations. The announcement followed an agreement between city officials and United Air Lines, on ground space rental and field fees. Boeing agreed to pay $2,400 a year and on June 1 will begin a schedule of six planes through Des Moines daily, three eastbound and three westbound, replacing the winter schedule.

The new hangar will be 375 feet north of the city hangar and on the same building line and will be of the same type of construction as the municipal hangar. Austin Co., Chicago, will be the builders. Boeing has been using space in the municipal hangar under agreement with Yellow Cab Airways, which holds a lease on the building.

Aero Trades Firm Obtains Certificate

AN APPROVED Repair Station Certificate, covering all classification of aircraft repairs and construction, has been granted by the Department of Commerce to the Aero Trades Co., Roosevelt Field, L. I., N. Y.

Airport for World's Fair Planned

AN EXTENSIVE AIRPORT will be completed in time for the opening of the World's Fair at Chicago, it is planned. Located at the southeast corner of Grant Park near the Adler Planetarium, the airport will be used for sightseeing flights and as a landing field for visiting planes. Accommodations will be provided for both landplanes and seaplanes. At least one hangar will be erected. Ramps and runways will be provided with ample capacity to handle the usual quota of sightseeing planes and the visiting planes expected during the duration of the fair.

Field Opens Night-Flying Season

WASHINGTON-HOOVER Airport, South Washington, Va., was scheduled to commence its third year of summer night flying over the capital on May 27. A new feature of the night flying this year will be that flights will be flown in four-passenger open planes. Heretofore, night sightseeing has been conducted in trimotor Stinson cabin ships.

Simultaneously with the opening of night flights, the airport swimming pool will inaugurate the opening of its swiming season. The pool will be operated by a group including Paul Collins, Gene Vidal and S. J. Solomon.

Get at the

MEANING

behind that word

DEPENDABLE

To be dependable an airplane must have certain qualities proved to a higher degree than any other kind of machine used for transportation. It must have structural strength—sure stability—a reserve capacity to perform beyond its declared figures—built so well that it is always ready to fly. A dependable plane is a *safe* plane. If it isn't safe, all the efforts represented in its design and production are wasted. Despite a prevailing reluctance to admit the fact that safety is the essence of successful airplane operation—even though many prefer to hush the whole question of safety—Bellanca at all times fearlessly gives to operators, passengers and owners a full statement of proof that in every phase of commercial speed flying Bellanca planes *are* safe!

BELLANCA AIRCRAFT CORPORATION
New Castle, Delaware
Bellanca Aircraft of Canada, Ltd., Montreal

The Bellanca line includes the 12-15 place AIRBUS, the 6 place SKYROCKET and the standard 6 place PACEMAKER. In every phase of performance—in every detail of construction—each Bellanca airplane is

Built **AS ONLY** BELLANCA **CAN BUILD**

AIRLINES and AIR TRAVEL

Eastern Air Moves to Atlanta

GENERAL OFFICES of Eastern Air Transport, Inc., were transferred late last month to Atlanta, Ga. The president's office and the general traffic office are now located in the General Motors Building, New York, N. Y.

E. R. Breech was recently chosen as chairman of the board of directors of the airline, and Capt. Thomas B. Doe has been renamed president. Other officers include Harold A. Elliott, vice president and general manager; Charles H. Dolan, vice president in charge of operations; L. Edwin Gill, vice president in charge of traffic; L. R. Beardsley, secretary; Joseph J. Mehl, treasurer; Frank W. Whitmore, assistant secretary and treasurer, and Thomas F. Armstrong, assistant treasurer.

Northwest Airways Enlarges Service

THE Twin Cities-Pembina, N. D., division of the Northwest Airways, Inc., has been extended northward to Winnipeg, Manitoba. The sixty-five-mile route from just south of the border was formerly flown by Canadian Airways, Ltd., which sublet its mail contract.

The Hamilton metal plane formerly used between the Twin Cities and Duluth, Minn., has been replaced by a Sikorsky amphibion.

R. S. Mayer has been appointed traffic representative for the airline in the Pacific Northwest, with headquarters at Boeing Field, Seattle, Wash.

New Propellers Improve Boeings

HIGHER PERFORMANCE for the new all-metal, low-wing, Twin-Wasp Boeing transports being delivered to United Air Lines has been obtained through the use of Hamilton Standard controllable-pitch propellers, according to Boeing Airplane Co. Not only has the cruising speed been stepped up from 165 miles an hour to 171 miles an hour, Boeing officials have announced, but improved take-off, rate-of-climb and single-engine performance also have been obtained. Tests have shown that the new Boeing not only will maintain level flight with one engine functioning, but will climb under full-load conditions.

Orders have been placed for a sufficient number of the controllable-pitch propellers to equip the last thirty planes of United Air Lines' sixty-plane order. Their selection followed tests by the Department of Commerce at Hartford, Conn.

The first thirty of the transports have been delivered to United's routes to make possible considerable reductions in air travel time. The production schedule calls for delivery of ten planes a month. Through transcontinental schedules between New York City, the Pacific Northwest and California are planned for early this month with coast-to-coast travel time of less than twenty hours. Schedules between New York and Chicago provide for a 4½- to five-hour trip.

Additional features of the new transport recently announced are buttons and lights which provide a practical visual intercommunication system, making it possible for passengers to summon the stewardess, for the stewardess to call the co-pilot or for the co-pilot to call the stewardess forward. Beside each passenger seat is an individual button connected with a light near the stewardess' seat. This light remains on until the stewardess switches it off. A similar system operates between the pilots' compartment and the stewardess' seat.

By means of an electric sign on the forward wall of the cabin, passengers are advised when to fasten seat belts and when not to smoke. The two requests may be flashed by the pilot simultaneously or separately. The "no smoking" sign is used during take-offs, landings and servicings, while the "seat belt" sign is lighted during landings, take-offs and rough weather.

Wedell-Williams Line Opens

A NEW Wedell-Williams air passenger service between New Orleans, La., and Laredo, Tex., via Houston and San Antonio, has been inaugurated. Lockheed Vega monoplanes are used on the line, which also makes possible new connections between Fort Worth and New Orleans by means of Bowen line planes from Fort Worth to Houston.

Alaskan Air Service Planned

WILBUR GORST, son of Verne Gorst, pioneer Northwest air transport operator, at Seattle, Wash., plans to give Alaska a modern taxi service 2,000 miles long, with a round trip in forty-eight hours. He has converted an amphibion formerly used on the Seattle-Bremerton air ferry lines into a seaplane capable of a speed of 100 miles an hour. Fast passenger plane service in Alaska will be established between White Horse and at St. Michael, a water trip ordinarily taking ten days.

Airline Re-establishes Cleveland Base

AMERICAN AIRWAYS, INC., has reopened the old Thompson base at the Cleveland, Ohio, airport. "Scotty" Clyde, who recently resigned from a partnership in the Aviation Engineering Co. of Chicago, has been retained as general manager of service, and C. J. Hansen is in charge of the base.

Direct air service across Lake Erie from Cleveland to Detroit was opened last month.

Fast New York-Chicago Service

A NEW high-speed service between New York and Chicago, via Buffalo and Detroit, was announced last month by L. D. Seymour, president of American Airways. Elapsed time between the two cities is scheduled as 5 hours, 49 minutes; actual flying time, slightly over five hours. The line is known as the "Valley Route."

The new service is over a lake-level route to Detroit and Buffalo, and from there follows the Susquehanna River valley and passes through the Delaware Water Gap to Newark.

New Curtiss Condor biplanes, carrying fifteen passengers, two pilots, a stewardess and 650 pounds of mail, baggage and express, at a top speed of 175 miles an hour, are used in the new service. Meals are served along the route in flight.

Washington-Delaware Line Projected

PLANS were announced last month for an airway between Washington, D. C., and Rehoboth Beach, Dela. Lester J. Sipe and Harry C. Behr of the York (Pa.) Flying Service, Inc., are sponsors of the proposed airline, which they hope to open early this month with two planes daily on a round-trip schedule. The trip can be flown in about forty minutes, but requires five hours by automobile.

Ship-to-Shore Mail Service Resumed

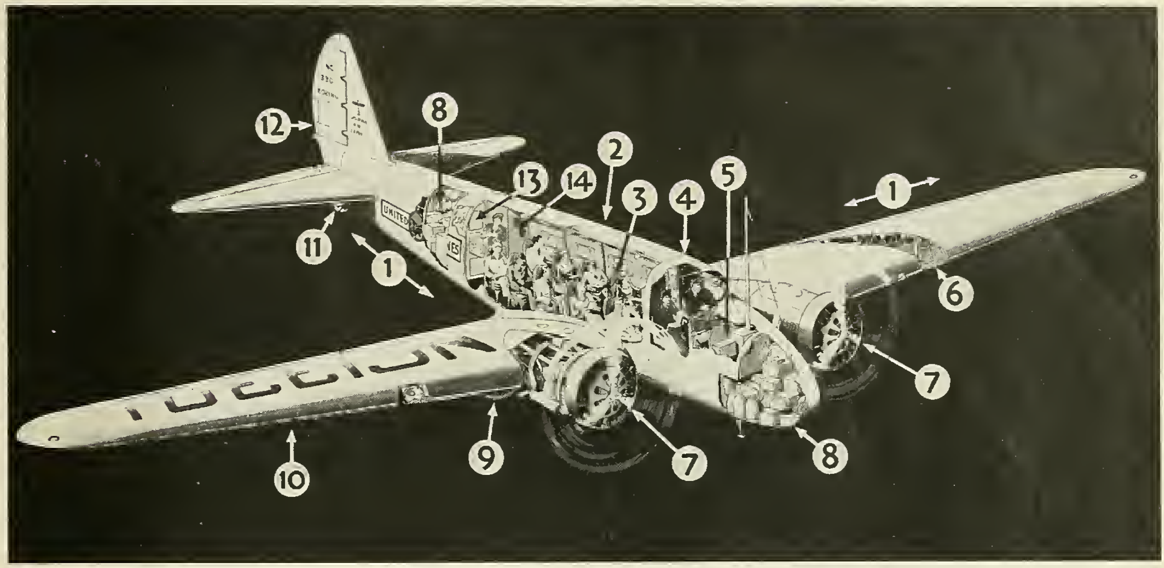
AIRPLANE delivery of mail from the North German Lloyd steamship *Europa* to New York was resumed May 12, when a plane piloted by Capt. Horst Schwendler took off from the ship sixty miles east of Nantucket Light, landing at South Brooklyn 4½ hours later. The airplane service, which advances delivery of mail by one day at both the American and European ends of the line, also is available on the *Bremen*, operated by the same company.

Elliott Roosevelt Manages Airline

GILPIN AIR LINES announced last month the appointment of Elliott Roosevelt, son of President Roosevelt, as general manager. The airline operates services between Los Angeles, Calif., and Agua Caliente, Mexico, and between Los Angeles and Palm Springs, Calif. Mr. Roosevelt, who has done publicity work and aviation surveys and has taken flying instruction, is reported to have expressed the intention of building up the charter service of the company. His mother, Mrs. Franklin D. Roosevelt, has announced that she plans to fly from Washington to California to visit him this month, returning by air after a stay of a few days.

(Continued on following page)

BOEING 247!



Responsible for the amazing speed, strength, payload, comfort and operating economy of the new Boeing transport are the following features:

1 All-metal streamlined construction to accelerate speed and necessitate a minimum of maintenance and repair. All main parts of one 247 interchangeable with those of another, including body sections, wing sections, etc.

2 Spacious cabin, with an interior length of 20 feet and height of 6 feet. Equipped with heating-cooling system, main and individual ventilators, dome lights, individual reading lamps and ash trays. Insulated against both noise and temperature conditions.

3 Wide upholstered chairs with adjustable reclining backs. Spaced 40 inches apart to provide ample leg room. Each chair beside a window.

4 Pilots' compartment with dual controls and complete assembly of flight and engine instruments. Standard night flying equipment.

5 Compartment for two-way radio telephone equipment which makes possible ground-plane communication as well as the reception of weather reports and directive radio beam signals.

6 Sturdy 74-foot all-metal cantilever wing, designed to withstand a load of 36½ tons.

7 Two 550-horsepower Pratt & Whitney Wasp motors, supercharged to 5000 feet. Three-bladed Hamilton Standard propellers. Engine ring cowls.

8 Compartments for mail, baggage and express. The nose pit is 60 cubic feet in size, and the rear compartment 65 cubic feet.

9 Retractable landing gear, equipped with Boeing oleo shock absorbers, hydraulic brakes and large, low-pressure tires. A differential of approximately 20 m.p.h. in speed is possible with the gear retracted. Although the plane has a gross weight of over 6 tons, the gear is designed to withstand a 32¼-ton load.

10 Thirty-seven inspection doors, strategically located, as well as removable wing tips, trailing edge of wing and tail cone, to facilitate inspection and maintenance.

11 Full swiveling tail wheel, equipped with oleo shock absorber and pneumatic tire.

12 Boeing-patented special trailing edge rudder, elevator and aileron flaps, which provide for trimming the plane in flight and for correcting unbalanced propellor thrust.

13 Stewardess' pantry. Meals are served aloft.

14 Lavatory.

This airplane on display in the dome of the Transportation Building, Century of Progress Exposition, Chicago. Also now in service of United Air Lines. . . . Detailed specifications on request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.

BOEING *has always built tomorrow's airplanes today!*

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(Continued from preceding page)

Eastern Airline Observes Anniversary

AIR TRANSPORT SERVICE along the Eastern Seaboard is now five years old. It was begun on May 1, 1928, as a night air mail line, operating only between New York and Atlanta, but now stretches over two routes serving twenty-eight important cities between New York and Miami.

Eastern Air Transport, a division of North American Aviation, operates the passenger, express and air mail services. In the five years since the route was begun, the company and its subsidiaries have flown 16,550,000 miles, have carried 3,250,000 pounds of air mail and approximately 218,000 passengers. The air express service was started only nine months ago, but 51,200 pounds of express have been transported.

When the company started operations, it had six small mail planes and sixty-one employees. Today it has a fleet of forty-eight airliners, including the Curtiss Condors, and 610 employees. Twenty-eight of the original employees are still on the payroll, and three of the original planes are still carrying mail on this line.

At the beginning Eastern Air Transport flew a schedule of 1,526 miles daily over an airway 763 miles long. Today it flies over 13,300 miles daily on routes 2,488 miles long.

American Airways Opens Boston Offices

IN ORDER to handle the increased business that has developed since the commencement of service between Boston and Chicago by way of Albany, American Airways, Inc., has opened passenger ticket offices on the ground floor at 250 Boylston Street, Boston. Limousines connecting with all schedules of American Airways leaving Boston for the south and west will call at prominent downtown hotels as well as stop at the new Boylston Street terminal before going to the East Boston airport to connect with outgoing ships, Arthur L. May, Boston city traffic manager, has announced.

Varney Plane Breaks Inter-City Record

ATMOSPHERIC CONDITIONS made it possible for a Varney Speed Lines plane to break all travel records between San Francisco and Los Angeles, Calif., last month. Eighty minutes after the low-wing Lockheed took off from the San Francisco Bay Airdrome the ship arrived at the Los Angeles United Airport. The plane carried three passengers in addition to Pilot Jess Hart. Airdrome officials estimate that the plane's speed en route varied from 260 to 275 miles an hour with changing wind conditions.

Barringer Joins Maine Air Transport

LEWIN B. BARRINGER has resigned as assistant secretary of the Wings Corp. of Philadelphia, Pa., to take a position with the Maine Air Transport in connection with their New Bedford-Nantucket, Mass., run.

Air Mail Observes Milestone

THE FIFTEENTH anniversary of a regular air mail service was marked May 15, with regularly scheduled up-to-date mail planes flying from coast to coast, and serving every section of the country both night and day. On May 15, 1918, an Army Curtiss JN-4H took off from New York and Washington, D. C., respectively, on the first regularly scheduled American air mail line. Piloted by Army fliers, working in cooperation with the Post Office Department, planes flew over the line for almost three months, carrying loads of 200 pounds at a maximum speed of 90 miles per hour. On August 10, 1918, the Post Office Department installed a civilian personnel on the line. The first transcontinental air mail including a scheduled stretch of night flying was dispatched to San Francisco from New York on July 1, 1924.

Unloading air express of Railway Express Agency through the nose of a new Boeing

Key Cities Compete in Airline Exhibit

INTEREST shown by cities invited to join American Airways in its exhibit at A Century of Progress Exposition in Chicago, Ill., June 1 to November 1, has led officials of the line to offer a prize for the outstanding civic display submitted. A committee of Chicago newspaper men will inspect the individual displays as soon as they are installed and choose the one which, in their opinion, is most outstanding. Invitations to participate were extended through the Chamber of Commerce in each city, so it was decided to award guest transportation to and from the Exposition to the president of the Chamber of Commerce in the city selected as best represented.

American Airways will be prominently featured in the exhibit of the Cord Corp., with which it is affiliated. An electrical map of the United States, more than 50 feet long and 30 feet high, will show the day and night operation of American Airways' planes, carrying passengers, air mail and air express from coast to coast and from Canada to the Gulf of Mexico. The exact movement of all American Airways planes will be shown on this map, together with other interesting details of airline operation. A large display case will be situated directly in front of the map, reserving space for the key cities of the line to present the story of their industries and their products to the Fair's visitors. No restrictions were placed upon the invitations except that the exhibits be representative of the individual city.

March Air Traffic Reveals Gains

SCHEDULED AIRLINES operating in continental United States carried 24,945 passengers in March, 1933, according to reports from 27 of the 28 companies operating, it was announced last month by the Aeronautics Branch of the Department of Commerce. This figure marked a gain over the passengers carried in January and February.

Miles flown by these airlines during the month were 3,662,432; express carried totaled 124,454 pounds, and passenger miles flown were 8,070,085. These statistics also showed increases over those for January and February.

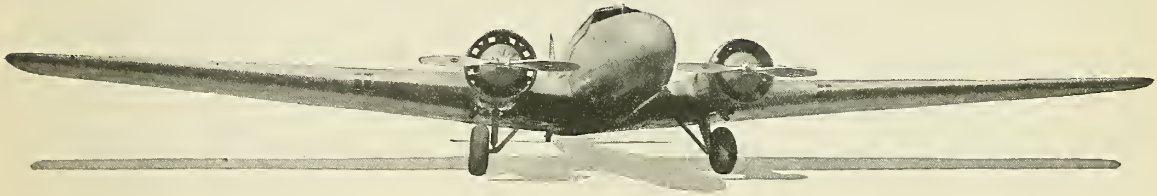
Comparisons with the first two months of the year are given in the following:

	January	February	March
Passengers carried	24,300	23,046	24,945
Express carried (lbs.)..	74,268	82,237	124,454
Miles flown	3,656,262	3,331,518	3,662,432
Passenger miles flown.	7,854,069	7,460,225	8,070,085

Airline Safety Reflected by Express

LESS than one-thousandth of one per cent of the gross revenue paid by shippers over the Air Express Division of the Railway Express Agency system has been refunded due to loss and damage claims, it was announced last month, due to safety of plane operation and increasing protection accorded shipments.

Hamilton Standard Controllables For Boeing Transports



After exhaustive tests, Hamilton Standard Controllable Propellers have been ordered for installation on the new low-wing Boeing Transports for United Air Lines. The use of controllable propellers demonstrated substantial improvement in take-off, climb, cruising, and single-engine performance.

HAMILTON STANDARD CONTROLLABLES
ARE IN USE BY, OR ON ORDER FOR,
THE FOLLOWING AIR LINES:

•

Pan-American Airways
Pan-American-Grace Airways
Transcontinental & Western Air, Inc.
United Air Lines

•

China National Aviation Corp.
Deutsche Luft Hansa, A.G.
Royal Dutch Air Lines (K.L.M.)
Swissair

HAMILTON STANDARD
HARTFORD
CONNECTICUT
DIVISION OF
UNITED AIRCRAFT & TRANSPORT
CORPORATION
PROPELLER COMPANY

HAMILTON STANDARD PROPELLER COMPANY · EAST HARTFORD · CONNECTICUT

PRIVATE FLYING

Spin Test for Private Pilots Canceled

AVIATORS seeking to qualify as private pilots under the more exacting requirements recently put into effect will not be asked to execute intentional spins and recoveries, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, has announced. Instead, they will be required to recover from stalls, and to prevent spins from stalled attitudes.

Some of the present holders of private pilot licenses have previously held licenses in higher grades and have voluntarily reduced their status to private because of the fact that they were no longer employed professionally as aviators, or for other reasons. Such pilots, according to Colonel Young, will be classified in the new private grade without further flight tests upon producing satisfactory evidence that they previously held licenses of higher grades. If the inspector has personal knowledge of the candidate's previous status, this will be sufficient; if not, the information will be supplied upon request to the Washington office of the Aeronautics Branch.

Under the new regulations a solo pilot is prohibited from carrying passengers at any time, although he may fly with other licensed pilots of equal or higher grade and may even sit at the dual controls with non-revenue passengers in the aircraft, provided there is a pilot holding a higher grade of license present at the controls and in command of the aircraft.

Air Cruises for Sportsmen Pilots

A SERIES of air cruises is being arranged exclusively for the non-professional elements in aviation and staged by airports throughout the country. According to Oliver L. Parks, who recently announced the series, the plan indicates a new appreciation of the part that non-professional pilots and owners of aircraft are playing and will continue to play in the new aviation picture. The number of private pilots has grown steadily each year from a total of 3,528 in 1929 to more than 10,500 today, and the number of privately owned planes has increased from 3,125 in 1929 to the present total of about 5,000. Solo cross-country flying or flying in the vicinity of one's home airport is not enough to satisfy the average pilot-owner. Properly conducted group activity is something the owners now can have.

More than 500 leading airports throughout the United States have just received copies of the National Air Cruise plan. The plan outlines the steps to be taken in setting up an air cruise for the benefit of owners in a given area, regardless of their home airports, and suggests the policies to be followed and the methods which have proved most successful in the past. One eastern airport already has conducted one of these national air cruises with success, and a number of other air cruises, including one for fifty to 100 aircraft, with Montreal as the destination, are being prepared by local airports.

National air cruises are not confined to any one season, any particular part of the country or any special type of airport. The airports plan to take turns in doing the executive work in connection with a cruise and also serve as hosts to visiting cruisers.

Tail Wind Club Race Ends in Tie

MISS LAURA INGALLS in a Stinson and Richard Snackerberg in a Curtiss Robin were tied for first place in an air derby held April 29 between Curtiss Airport, Valley Stream, L. I., N. Y., and Atlantic City. The first of a series of handicap events for owners of private planes, the race was held under the auspices of the Tail Wind Club, an organization of private plane owners and operators at the Valley Stream airport. Ten planes started in the race, which was under the direction of Bruce Johnson, manager of the airport.

Club Prepares for Flying Season

THE LITTLE FALLS (N. Y.) Flying Club, which was organized last year, has made arrangements for the flying season, opening about May 30. Their Fleet plane has been overhauled at Utica Municipal Airport, and Seymour Field, where a wind cone will be erected, will be used again as headquarters. Wells S. Davy is president of the club.

Langley Day Race Results

H. A. LITTLE, piloting a Monocoupe, won both the featured speed race and the dead-stick landing contest at the Langley Day sportsmen pilots' celebration, held May 7 at College Park (Md.) Airport. Other double winners were Laurence P. Sharples, who was first in the race for airplanes with a maximum speed not exceeding 125 miles per hour and in the aerobatic contest, and C. W. Clements, who won the race for airplanes with a maximum speed not exceeding 115 miles per hour and the bomb-dropping contest. Held under the auspices of the Washington Air Derby Association, cooperating with the Greater National Capital Committee, the events were competed in by sportsmen pilots from the neighboring states.

Winners of the various contests and their marks were as follows:

Thirty-mile race, open to airplanes with a maximum speed not exceeding 115 miles per hour, C. W. Clements, Monocoupe; 12 minutes, 19 seconds.

Thirty-mile race, open to airplanes with a maximum speed not exceeding 125 miles per hour, Laurence P. Sharples, Travel Air; 10 minutes, 56 seconds.

Thirty-mile race, open to airplanes with a maximum speed not exceeding 140 miles per hour, H. A. Little, Monocoupe; 10 minutes, 14 seconds.

Thirty-mile free-for-all, each plane handicapped according to its advertised speed, C. J. Wilke, Waco; 8 minutes, 46 seconds.

Aerobatics, Laurence P. Sharples, Travel Air.

Twenty-mile race at slowest speeds possible, Robert Baber, Aeronca; 20 minutes, 32 seconds.

Twenty-mile race, open to airplanes powered with OX-5 engines, L. N. Jordan, Challenger; 8 minutes, 27 seconds.

Dead-stick landing contest, H. A. Little, Monocoupe; 8 feet, 3¼ inches from mark.

Women's thirty-mile handicap race, Miss Helen McCloskey, Monocoupe; 12 minutes, 24 seconds.

Bomb-dropping contest, C. W. Clements; 50 feet from mark.

Scale model airplane contest, Richard Hooper; Curtiss F-11C2.

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complete with Magneto Shields
WMN7 — Continental, Warner & Wright 7-cylinder motors **$35.00**
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WVAG—Wasp, Hornet & Wright 9-cylinder motors **45.00**

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WESTPORT AIRCRAFT RADIOS
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Westport Ground Station Radio Model **GR8**...... **79.50**

Makes money for distributors

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Aside from unusual sales appeal created by inherent security and wide utility, the Pitcairn Autogiro has still another money-making asset. That is "public interest."

To a far greater extent than conventional aircraft the Pitcairn Autogiro attracts interested eyes to skies and fascinated crowds to flying fields.

The craft itself is its own best advertisement, and a valuable item of publicity to everyone who sells it.

Those who will not ride in other forms of aircraft are eager to experience the security the Pitcairn Autogiro offers, and enjoy its unique and different kind of flying.

6 WAYS TO PROFIT!

1. Sales to private owners. 2. Sales to business companies for transport and publicity. 3. Sale of advertising "time" to others. 4. Revenue from passenger hops or charter trips. 5. Flight instruction or student training. 6. Revenue from storage, servicing, etc.

DEALERS AND DISTRIBUTORS

CALIFORNIA—Pacific Giro Sales, Inc., Grand Central Air Terminal, Glendale.

ILLINOIS—Pal-Waukee Airport, Inc., 1116 Marquette Building, Chicago.

MASSACHUSETTS — Jesse K. Fenno, Providence Airport, Seekonk; New England Giro Co., Boston Airport, East Boston.

NEW YORK — Gilbert Flying Service, Inc., Curtis Field, Valley Stream, L. I.

PENNSYLVANIA—Garden Spot Motor Co., Prince and James Sts., Lancaster; Harrisburg Autogiro Sales Co., 222 Telegraph Building, Harrisburg; W. R. Miller, Campbelltown; Pitcairn Aeronautical Corp., Pitcairn Field, Willow Grove; Soule Autogiro Sales Company, Miners Bank Building, Wilkes-Barre; J. Frank Wilson, Boiling Springs.

TEXAS—Jim Davis Flying Service, Inc., Houston Airport, Houston.

VIRGINIA—Atlantic Seaboard Airways, Inc., Washington-Hoover Airport, S. Washington.

This alone provides important revenue for Pitcairn dealers, in passenger hops for sightseeing, as well as charter transport trips.

The sale of advertising "time" to others with trailing banners or painted signs upon the craft, is already important and growing to wider use by individuals and corporations. The use of Autogiros for safe training of student pilots before they attempt the more critical stages of flying other types of aircraft, offers another possible source of income.

These are avenues of revenue not theoretical, but actually being proved by Pitcairn distributors and dealers. Write for further details.

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NEWS OF THE SCHOOLS

Commander Weems to Join Ryan Staff

LT. COMDR. P. V. H. WEEMS, originator of the Weems System of Navigation, will affiliate his services with the Ryan School of Aeronautics at San Diego, Calif., after his retirement from the Navy in June, according to an announcement made by T. Claude Ryan, school president.

Commander Weems has devoted years of study and research with the government to the furtherance of the science of navigation, and his methods of computation have been used on many of the world's outstanding flights. He is the author of numerous special books and articles on navigation and allied subjects. One of his best known is his treatise entitled "Air Navigation," which won him special recognition and the award of the gold medal by the Aero Club of France.

Commander Weems' classes at the Ryan school will be conducted in the form of both residence and home study courses, so that pilots who can not come to San Diego may receive the benefit of instruction under his personal supervision. All of the Weems courses will be centralized in the new buildings of the Ryan school at Lindbergh Field, San Diego.

Boeing Scholarship Winners Announced

WINNERS of the fourth annual W. E. Boeing aviation scholarships were announced by the national committee of award after a meeting held in Chicago on May 8 to judge essays submitted on over 250 aeronautical subjects by college undergraduates from institutions in thirty-three states.

Robert E. Hayes, student at the University of Michigan, won first prize, a $5,200 master pilot course at the Boeing School of Aeronautics, Oakland, Calif., with an essay on the subject of trends in aircraft construction. This course includes 250 hours of flying and 924 hours of ground instruction. James M. Walthew, University of Washington, won second award, a nine months' master mechanic course with twenty hours of flying. Third and fourth awards, master mechanic or master pilot ground courses, were won by Paul W. Nosker, Antioch College, and Richard McBrien, University of Oklahoma. The winners will commence their prize courses at the Boeing School on July 5.

School Opens Avigation Course

A COURSE IN AVIGATION has been added to the curriculum of the Merchant Marine School of the Seamen's Church Institute of New York, 25 South Street, New York, N. Y. The new course will be given during the daytime and in the evening, every weekday. It is primarily for transport pilots but is also open to students of aviation. The course consists of cross-country navigation, advanced and celestial navigation, navigation and plotting for long-distance flights, charts and maps prepared for long-distance flights and airline surveys.

Hubert Huntington has been added to the staff of instructors at the Merchant Marine School to conduct the course. He was formerly an instructor with the Curtiss Flying Service and chief navigator with the American International Airways. He was navigator on the airplane *Southern Star,* with Harold E. McMahon as chief pilot, on its goodwill flight and survey to South America.

Capt. Robert Huntington is principal of the Merchant Marine School, which has been in existence seventeen years.

School Gives Blind Flying Course

O. J. WHITNEY, INC., of Glenn Curtiss Air Terminal, North Beach, L. I., N. Y., is operating an intensive course in blind flying. Two planes with necessary radio and instruments for training are used, and instruction is given by experienced fliers. Pilots who successfully complete the blind flying course will receive an S. A. T. rating, and air transport companies are sending pilots to take the special training.

The company also operates a regular flying school, including radio instruction. Planes may be chartered for all purposes night and day, and a special plane is provided for aerial survey work.

Private Flying Course at Pittsburgh

R. V. TRADER AND ASSOCIATES at Curtiss-Bettis Airport, Pittsburgh, Pa., are offering a private pilot's course for which over thirty students have signed up since the first of the year.

Boeing School Graduates Sixteen

COMMENCEMENT EXERCISES for the twelfth graduating class of the Boeing School of Aeronautics were held at the Oakland (Calif.) Airport recently. Sixteen students were graduated.

New Instructors At Floyd Bennett

ERICKSON & REMMERT Flying School, a Government-approved school at Floyd Bennett Field, Brooklyn, N. Y., now has its flight instruction under the supervision of Roger Q. Williams and Andy Stinis. Several new students have been enrolled during the past few weeks.

Jamaica Sea Airport School

ELWOOD KEIM of Rosedale, L. I., N. Y., recently opened a school at the Jamaica Sea Airport, Jamaica, N. Y., and reported the enrolment of eleven students. Mr. Keim is also operating a storage hangar for the ships of private owners who use the airport.

Parks Offers Short, Low-Price Courses

PARKS AIR COLLEGE, East St. Louis, Ill., has announced seven new, short, low-priced courses in various aviation subjects. Time required to complete them ranges from three to nine weeks. These courses are intended for high school and college men who want to devote part of their summer vacations to summer training; for men who, for financial or other reasons, cannot enroll for longer training at this time, and for men who want to specialize in only one branch of aviation work.

A special twenty-two-hour flying course is offered, which requires four weeks to complete. Other new courses include: Airplane woodworking, metal work, aircraft welding, fabric and finishing, rigging and final assembly and aircraft engines. Enrolment in the new courses opens June 1, and since each student receives individual instruction, students may start any Monday thereafter.

Ryan Gives High School Ground Course

A SPECIAL ground course of lectures which San Diego, Calif., high school students attend once each week during their regular school semester is a recent innovation at the Ryan School of Aeronautics. Four optional periods are available, so that the students may select their class without interference with their regular high school program. All lectures are held in the regular Ryan classrooms at Lindbergh Field. The course is augmented by personally conducted tours of inspection through the bases for the Navy and Army planes at North Island and Rockwell Field, San Diego, as well as through the commercial airline hangars and shops, airport weather bureau and other points of special interest at Lindbergh Field. All classes are conducted by Harry Kappner of the Ryan training staff. Forty-five students were enrolled for the first series of lectures. At the completion of the course, each student will be given an actual flight lesson in a Great Lakes plane.

The Ryan School will conduct another class for high school students during the summer vacation. This will be completed in time to begin a third series of lectures to coincide with the regular public school semester in the fall.

Aeronautic Texts Published by Haaren

A NEW PLAN for the benefit of students of Haaren High School's Aviation Annex in New York has been devised by its aeronautics instructors. A text book for each term of the aviation course is being published and distributed by the faculty. The books cover the three-year curriculum now in effect at the school.

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THE ONLY *Million Dollar* Commercial Flying School in the World

GOVERNMENT APPROVED

Now! SPECIAL OPPORTUNITY ANNOUNCEMENT

FREE
American Transport
Goggles and
Scully Helmets

JUNE 1-JULY 15, ONLY

Many Other Special Prizes
to Students Who Enroll
from June 1 to July 15

FREE
Complete Mechanic's
Tool Kit and
Spartan Coveralls

THE SPARTAN SCHOOL OF AERONAUTICS will give FREE to any student who enrolls for a Transport Pilot's Course between June 1st and July 15th, 1933, one pair of American Transport goggles and one Scully Air Mail helmet.

To any student who enrolls for the Limited Commercial Pilot's Course or Private Pilot's Course, we will give FREE, one pair of Resistal Goggles and one Scully Air Mail helmet.

To any student who enrolls for the Master Mechanic's Pilot's Course, we will give FREE one complete mechanic's tool kit and one suit of Spartan coveralls.

To any student who enrolls for the Master Mechanic's Ground Course, we will give FREE one complete mechanic's tool kit.

To any student who enrolls for the Regular Mechanic's Ground Course, we will give FREE one suit of Spartan coveralls.

This is a SPECIAL SUMMER OFFER and will last from June 1st to July 15th ONLY. To those students who have already sent in their enrollment blanks, this FREE offer will be effective even though they arrive at Spartan before June 1st.

NEW PRICES NOW IN EFFECT

Transport Pilot's Flight and Ground Course	$1,745.00
Limited Commercial Pilot's Flight and Ground Course	520.00
Private Pilot's Flight and Ground Course	375.00
Master Mechanic's Flight Course (Solo Pilot's License)	300.00
Master Mechanic's Ground Course (5 Months)	225.00
Regular Mechanic's Flight Course (Solo Pilot's License)	225.00
Regular Mechanic's Ground Course (3 Months)	135.00

Room rent FREE with any above course during entire period of training.

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Curtiss-Wright School of Aeronautics, Valley Stream

ALBERT I. LODWICK

Director of Public Relations, Curtiss-Wright Corporation

Advanced Radial Engine Instruction

● A PRACTICAL as well as a theoretical course is included in the curriculum of the Curtiss-Wright School of Aeronautics at Valley Stream Airport, Valley Stream, Long Island, N. Y., which gives complete training in the mechanics of aviation. This school is under the direct supervision of Bruce Johnson, manager of Curtiss-Wright airports on Long Island. The chief instructor, Earl Southee, who has been in aviation for the past nineteen years, is a graduate of University of Pennsylvania, was a flier during the World War and has had many years' experience in the construction, maintenance and repair of aircraft and aircraft engines. All the other instructors, as well as Mr. Southee, are authorities on aircraft and aircraft engines.

Students Testing Aeronautical Instruments

The school is run on a regular business basis, each student being graded daily on his work in the classroom as well as in the shop. Students are instructed in the theory of flight, the airworthiness requirements of the Department of Commerce for aircraft and aircraft engines, licensing procedure, construction of various types of aircraft including amphibions, landplanes, and seaplanes. Students learn of the latest developments in airplane construction, the advantages of such new innovations as auxiliary controls, retractable landing gears, wheel fairings, slot and flap developments, controllable-pitch propellers, as well as developments in the accessory and aircraft engine field.

Cutaway Models Used for Study

By the use of cutaway models, students are shown the various types of carburetors, magnetos, superchargers, propellers, pistons, crankshafts, valves and cylinder head designs. In addition, a cutaway model of a Wright Whirlwind engine is used to show the principal features of radial engine construction, including timing gears, ignition systems, oil lines, the rotary method of internal supercharging, accessory assemblies including machine gun synchronizers, the advantages of multiple valve springs, dual ignition, sodium-filled exhaust tulip valves, concave waffle-iron cast pistons, forged pistons, one- and two-piece crankshafts, spark plug coolers, etc.

In the shop the first practical training received is in disassembly, where the student is required to tear down completely a modern airplane. On a recent visit to the school the students were working on both landplanes and amphibions. The airplanes on which the students work are of many different makes and models, so that instruction is not limited to one type or model of plane. The student, on tearing down the ship under the supervision of instructors, must inspect every welded joint, fitting, cable, bolt, nut, rib and spar, and with the assistance of the instructor in charge, determine those parts which need to be replaced by new ones and those which may be repaired. Then he must build up those parts himself, whether they are metal or wooden ribs, tail surfaces, spars, parts of the fuselage, engine mounting or parts of the landing gear. Thus the student becomes familiar with the use of lathes, hand- and motor-driven saws and planers as well as all the tools used in repairing an airplane. This part of the aeronautical training includes a complete course in welding of both flat and tubular steel, including such accessories as exhaust stacks, engine mounting rings, as well as parts of the fuselage, wings, tail surfaces and landing gear.

After properly treating the wooden or metal wings and fuselage to prevent deterioration, the student is required to cover them with cotton fabric, doing all the stitching, shaping and fitting under the supervision of instructors. After covering the wings and fuselage, the student then receives instruction in the proper method of doping and painting the airplane. This includes working with clear and pigmented dope and printing the necessary Department of Commerce license numbers on the wing and tail surfaces in accordance with the regulations of the Government.

The student spends part of his time in the stockroom, assisting the regular employees in waiting on customers and checking stock control records. This gives him a good general knowledge of how to properly conduct a stockroom.

Students also spend part time on the field, assisting in welcoming the pilots and passengers of visiting ships, filling gasoline and oil tanks and flagging ships in and out of the field, a type of work which gives the student an insight into general airport routine and management.

Actual Work Follows Theory

Following the instruction concerning the maintenance, construction and repair of the fuselage, landing gear and wings, the student then is trained in the construction, maintenance and repair of the power plant assembly. After learning the theory of internal combustion engines and the functions of the various parts of the engine, whether it be a Wright Cyclone, Wright Whirlwind, or P. & W. Wasp, the student is required completely to disassemble an engine and with the assistance of the instructor make a list of the parts which need replacing. The student also tears down and inspects all parts of the accessories, including magnetos, generators, spark plugs, carburetors, starters, fuel pumps and every other accessory included in the engine assembly. Then he must completely assemble the engine and accessories, make all the necessary adjustments, including timing of the engine, making proper bearing clearances, etc. Proper equipment is provided for the testing of magnetos, carburetors, spark plugs, generators and starters.

The engine is then run on test stands. If it does not function as it should, it is up to the student, with the help of the instructor, to adjust it until it is in proper running condition. Engines are also "jimmied" by the instructors, after which the students are given an opportunity to determine what is wrong and then start the engine. Thus the students receive actual experience in "trouble shooting." Instruction is given in the construction and repair of fuel and oil gauges, altimeters, airspeed indicators and other instruments. Students must know all about fuel systems, general lubrication systems of both radial and in-line engines, various types of carburetors, starters, valves, generators, timing mechanisms, oleo struts, brakes and splicing of cables as well as the innumerable other details which it is necessary for a mechanic to know to be able to service properly all types of aircraft and engines.

Thus a student at this school receives a practical as well as a theoretical education. Many of the students at the school now are taking this course in mechanics of aviation in order to receive a general education concerning aircraft and aircraft engine construction, maintenance and repair, planning at some later date to enter the sales or executive fields of aviation.

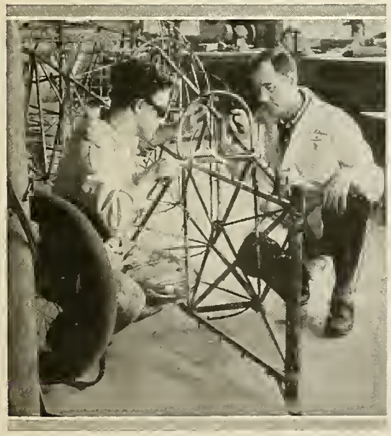
The reputation of the school in foreign countries as well as the United States is evidenced by the fact that today students from ten foreign countries are included in the class of over 100 students now in attendance at the Curtiss-Wright school. These countries include Sweden, Denmark, China, Colombia, Greece, Porto Rico, Russia, Mexico, England, and Italy. Many of them have come to this country to acquire a complete aeronautical education, after which they plan to return to their native lands and instruct their fellow countrymen in the construction, maintenance and repair of both aircraft and engines, and commercial airport operations as taught in America.

Better Training in United States

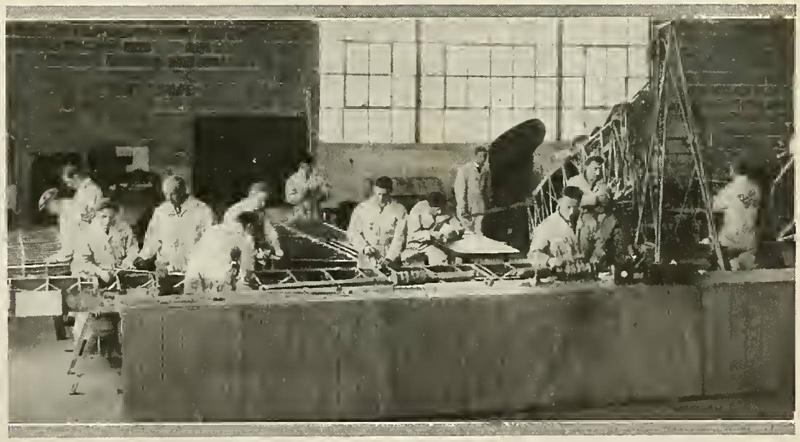
It is believed that this large enrollment of foreign students is due to the fact that the aviation industry of the United States is leading the world today, and foreign students feel that better instruction is available in the United States than in any other country. In connection with the rapid advancement of aviation schools in the United States, it is interesting to note that the air transport lines of the United States have shown tremendous advancement during the past few years and today carry more passengers, more pounds of mail and express and fly more miles than all the airlines of the rest of the world combined. This steady increase in air travel is even more interesting when we realize that other forms of transportation are experiencing serious decreases.

Complete Assembly and Rigging

Arrangements have been completed with New York University's Guggenheim School of Aeronautics, to allow university credit to their students who desire to receive this practical training at the Valley Stream airport.



Individual Aircraft Welding Instruction



Practical Training in Complete Rebuilding of Modern Airplanes

The Stearman Model 80

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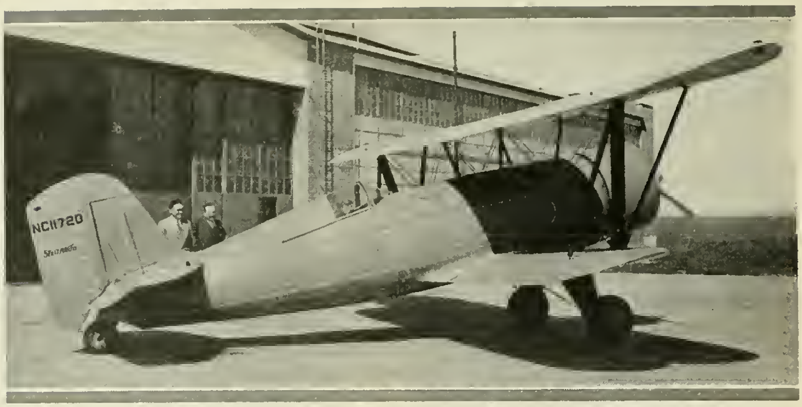
Latest addition to the Stearman line of Junior Speedmail, Business Speedster and Cloudboy models



• THE STEARMAN MODEL 80 is a two-place biplane of steel tube fuselage construction, cloth covered. The wings are built of especially selected spruce with a pigmented doped cloth covering. Slotted balanced-type ailerons, offset rudder trailing edge to correct for torque action, wire-braced landing gear and careful streamlining constitute a few of the design features that contribute to the increased speed and excellent handling qualities of the ship. High incidence factors of 8.5 and landing factors of 6.5 contribute to the safety of the Model 80.

The ship may easily be equipped as a seaplane, using Model 3830 Edo floats.

The Model 81, seaplane version of the Model 80, weighs 2,904 pounds empty and 4,020 pounds gross; top speed 165 m.p.h., and cruising speed 140 m.p.h. at 1,950 r.p.m. Carrying two persons, 81 pounds of baggage, 105 gallons of fuel and 10 gallons of oil, it takes off from the water in 14 to 16 seconds.

The engine is a Pratt & Whitney Wasp Junior Model T3A, rated at 420 horsepower at 2,200 r.p.m. Stanavo 80-octane fuel is used.

In the rear cockpit the following Pioneer instruments are used: Compass, airspeed indicator, rate-of-climb indicator, tachometer, turn-and-bank indicator, altimeter, fuel gauge and clock. Also the following are provided: G. E. engine temperature indicator, Scintilla switch, volt ammeter and the necessary engine instruments. All are arranged for convenient reading. In the forward cockpit are installed Pioneer compass, air speed indicator and altimeter.

A Lear Radioaire with a frequency range of 235 to 720 KC and one headset with Rome engine shielding and complete airplane bonding, together with all the necessary equipment for convenient and efficient radio reception, is provided.

An Eclipse electric starter, 15-volt, 15-amp. Eclipse generator, generator control box and a master switch are specified. Three instrument board lights with adjustable shields working in combination with rheostats to control the luminosity are provided. Two of these lights are in the rear cockpit; one in the front. Switches are conveniently located on the instrument panel. Electrical energy is furnished from an Exide storage battery.

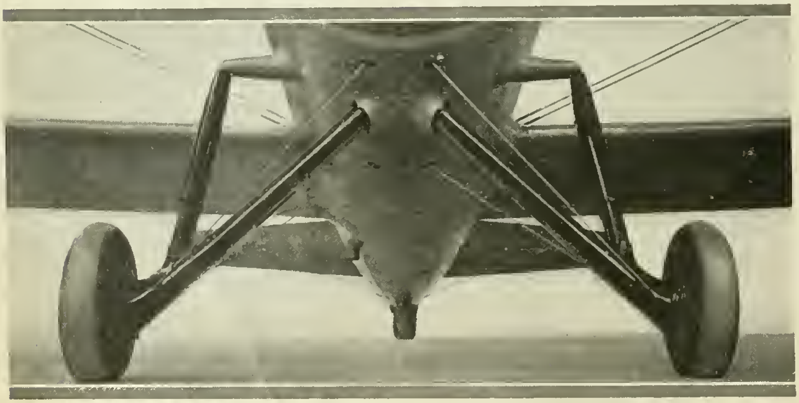
C. M. Hall landing lights are installed in the entering edge of the lower wings. Pyle-National navigation lights and five electrically operated Elgin flares complete the night flying equipment.

A Hamilton Standard hydro-pitch metal propeller is used. Its use facilitates taking off quickly from land or water. A fixed-pitch propeller of design equivalent to the high-pitch setting for the hydro propeller may be substituted if desired.

General streamline 24-inch tires are used, and the performance figures given here are based on their use. The shock unit is a conventional Aerol oleo strut, used both on the landing gear proper and the tail wheel. Wheel tread is 7 feet 3 inches. A 12- by 5-inch air wheel is used in the tail unit, which casters through an angle of 360 degrees.

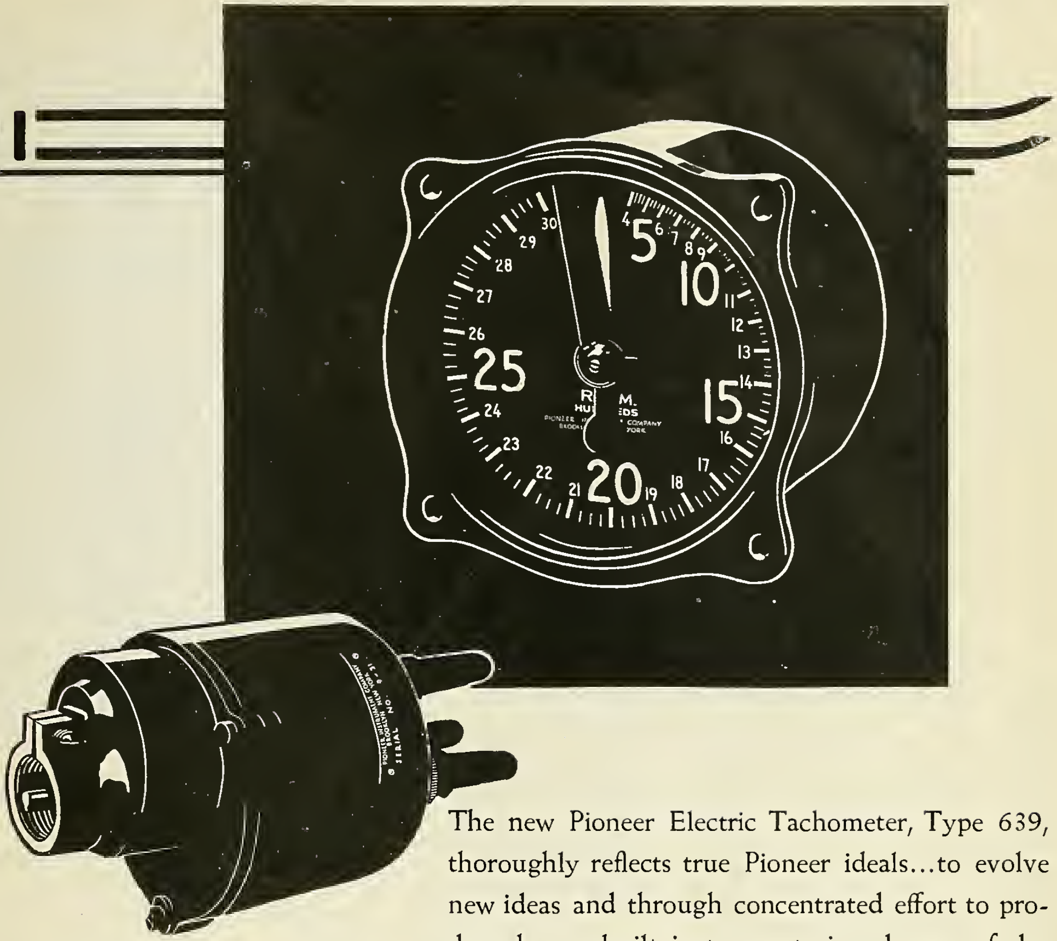
The rear cockpit has a transparent enclosure, sliding back over the head rest, and the front cockpit has a removable windshield for flying as an open cockpit and a metal cover to be used when the airplane is flown as a single-seater. A cockpit enclosure can be supplied to cover both front and rear cockpits if desired. By converting the passenger compartment, 27 cubic feet of cargo space may be gained.

The Model 80 is equipped with dual flight and brake controls except parking brake controls, which are in the rear cockpit only. Dual flight controls include dual stabilizer controls.


Streamline wheels, tires and landing gear of the Stearman Model 80

Specifications

Wing span	35 feet 0 inches
Length overall	25 feet 1 inch
Height overall	9 feet 8 inches
Wing area	275 square feet
Wing loading	12.72 pounds per square foot
Power loading	8.33 pounds per horsepower
Weight empty	2436 pounds
Useful load	1064 pounds
Pay load (104 gallons fuel)	210 pounds
Total gross weight	3500 pounds
Engine	P. & W. Wasp Jr., Model T3A
Rated power at 2200 r.p.m.	420 horsepower
Fuel capacity	104 gallons
Oil capacity	8 gallons
Maximum speed, full load	175 miles per hr.
Cruising speed, full load	151 miles per hour
Landing speed, full load	58 miles per hour
Rate of climb, full load	1600 feet per minute
Service ceiling	19,600 feet
Normal cruising range	650 miles



The new Pioneer Electric Tachometer, Type 639, thoroughly reflects true Pioneer ideals...to evolve new ideas and through concentrated effort to produce honor-built instruments in advance of demand. After many years of development, in conjunction with the U. S. Navy, this new instrument is presented with several important advantages in addition to those commonly found in this type of engine-speed indicator. Comprising two units...a two-phase alternating current generator and an indicator of the induction disc type, this principle is entirely new in application and definitely eliminates the difficulties experienced with former instruments of this type. There are no brushes or moving contacts of any kind. No shock absorber or special mounting is required for the indicator. The hand, which is remarkably free from vibration, operates over a 350 degree of scale arc, thus providing an open scale not found in any other electric tachometer. Despite extreme conditions, accuracy is assured by Pioneer's method of compensation for temperature variation. Reliability is materially increased and maintenance reduced by the provision for radio shielding and operating the instrument without commutator, slip rings, or moving coils. The new Pioneer Tachometer, Type 639, is offered with the reputation and integrity of Pioneer to back it.

PIONEER INSTRUMENTS

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BROOKLYN · NEW YORK · A SUBSIDIARY OF THE BENDIX AVIATION CORPORATION

Waco Model UIC Seaplane

●

HUGH R. PERRY

Sales Manager, Waco Aircraft Company

Waco U I C in flight over New York

• The Waco four-place cabin plane has been adapted for water flying by the installation of twin Edo all-metal floats. With this equipment the ship is known as the Model UIC seaplane and shows a performance comparing favorably with its unusual flying characteristics as a landplane. A standard model and two special models are available, each including a metal propeller, starter, hot-shot battery, N.A.C.A. cowl, large fin and rudder and Edo P3300 float gear.

The standard fuel capacity is 50 gallons, and the two special models have a capacity of 67 and 70 gallons of fuel, respectively. In the latter cases, 38 pounds of oil are carried instead of 30. Standard baggage capacity is for 100 pounds, and normally 26 pounds of extra equipment may be carried. Where the gross weight is less than the allowable 3,250 pounds, additional equipment may be carried, provided it is so located as not to affect the flight characteristics.

Construction throughout is conventional, being developed from a long line of successful commercial types in which the Waco company has specialized over a period of years. Wings have wood spars and ribs and are fabric-covered. The fuselage and tail surfaces are of welded steel tubing, fabric-covered.

One of the inherent features of the design is the wide field of vision for the pilot and passengers. This is accomplished by the use of windows overhead and rearward in addition to the large windows forward and at the sides. The pronounced stagger permits an unusually extensive field of vision downward ahead of the lower wing, an especially valuable feature for seaplane flying.

Standard equipment includes an air speed indicator, Heywood engine starter, tachometer, altimeter, compass, oil pressure and oil temperature gauges, navigation lights, dual flying controls, carrying compartment for luggage, hats, tools, etc.; tie-down ropes, medical kit, log book, engine cover, complete tools, throw-over wheel control with dual rudder pedals, dome light, ash trays, door locks and controlled hot and cold air ventilation.

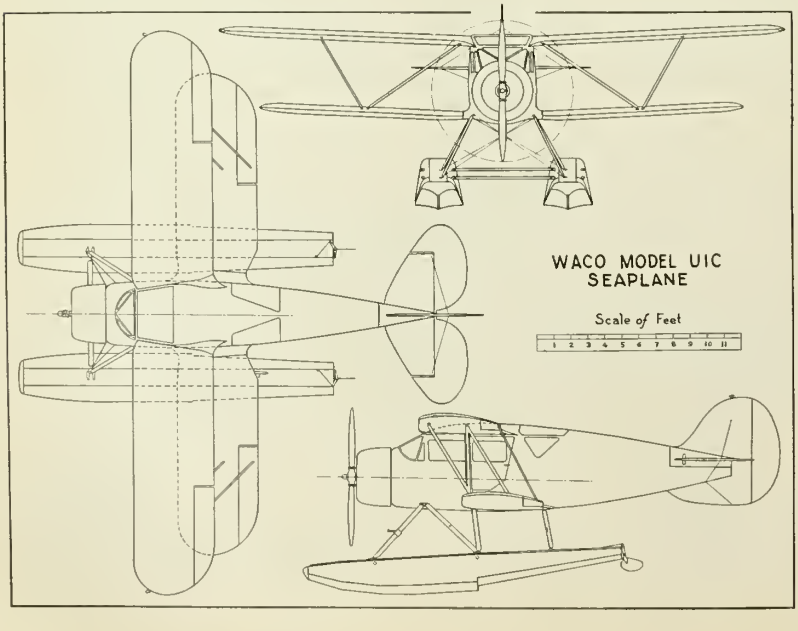
On the landplane the following also are provided: Warner wheels (including tail wheel), dual Warner brakes, dual brake control, parking brake and Waco shock absorbers.

The seven-cylinder Continental R-690 engine is rated at 210 horsepower at 2000 r.p.m. A Curtiss-Wright 99-inch-diameter propeller or a Hamilton-Standard metal propeller are optional equipment.

The performance figures given below are guaranteed by the manufacturer to be accurate within 2%.

Specifications

Wing span, upper	33 feet 3 inches
Wing span, lower	28 feet 3 inches
Length overall	28 feet 11 inches
Height overall	10 feet 7 inches
Chord, both wings	57 inches
Wing area, inc. ailerons	240 sq. ft.
Stagger	31 inches
Tread	90 inches
Top speed	126 miles per hour
Cruising speed	110 miles per hour
Landing speed (loaded)	52 m.p.h.
Average take-off (loaded)	32 seconds
Weight empty	2079 pounds
Fuel load	300 pounds
Pilot's weight	170 pounds
Weight of passengers	510 pounds
Weight of baggage	100 pounds
Weight of tools, anchor, rope	35 pounds
Gross weight	3224 pounds
Gross weight allowable	3250 pounds



Digest of Technical Articles from Foreign Publications

By Elsa Gardner

Metal Viscosities

Measurements of the Solid Viscosities of Metals Through the Flexural Vibrations of a Bar. K. Sezawa. Tokio Imperial University, Aeronautical Research Institute—Report No. 89, Vol. 7, No. 8, December, 1932, pp. 195-231. 18 figs.

COEFFICIENTS of solid viscosity for aluminum, duralumin, copper and brass were determined by means of the flexural vibrations of a bar, the resistance due to damping being assumed to be proportional to the velocity of the deformation of that body. The experiment suggested that the resonance condition of an airplane is detrimental to its behavior, as no dissipation of energy is radiated outwards from its boundary, while at the same time the damping due to internal viscosity is too small in such a body. It was shown that the damping constants of metals, even in such a high vacuum as a 1/2000 mm. of mercury column, depend on the amplitude of the vibrations. The greater the amplitude, the greater becomes the coefficient of solid viscosity.

Internal Combustion Turbine

The Internal Combustion Turbine for Aviation (La turbina a combustione interna e l'aviazione), M. Roy. L'Aerotecnica, Vol. 13, Nos. 1 and 2, January and February, 1933, pp. 58-69.

A PRECEDING ARTICLE published in this magazine (and abstracted in AERO DIGEST) is discussed by a professor of the Ecole Supérieure d'Aéronautique de Paris. The author examines the question of a turbine with combustion at constant volume which is preferred by Professor Capetti, the previous author, and compares it with the turbine having combustion at constant pressure which the author prefers himself. The article is followed by a comment of Professor Capetti in which he agrees with Professor Roy that the whole future of the internal combustion turbine depends on the progress of the single efficiencies.

Duralumin Tubes

The Behavior of Thin Duralumin Tubes Subjected to Bending and Torsional Stresses and Their Applications in the Construction of Aircraft (Sul comportamento dei tubi sottili in dural assoggettati a flesso-torsione e sulle loro applicazioni nella costruzione degli aeromobili), G. Gabrielli. L'Aerotecnica, Vol. 12, No. 12, December, 1932, pp. 1594-1605, 8 figs.

RESULTS of experiments carried out under the author's direction in the experimental laboratory of the Società Anonima Aeronautica d'Italia are described. Thin duralumin tubes were subjected to stresses of torsion, bending, and combined torsion and bending and their behavior noted. The author considers the use of thin tubes in aircraft parts and particularly as essential parts of cantilever wings, defining the characteristic curve of the wing and comparing it to the experimental resistance curve of the tubes subjected to combined bending and torsion. He concludes with details of a single-spar wing which he has patented.

Aerodynamics

Velocity Field in a Plain Current of a Compressible Fluid (Campo di velocità in una corrente plana di fluido compressibile), L. Poggi. L'Aerotecnica, Vol. 12, No. 12, December, 1932, pp. 1579-1593. 1 fig.

THE BASIS of the author's method is the idea that a velocity field in a compressible fluid, at any point for which there is a given value of divergence, can be compared to a field in an incompressible fluid obtained by superimposing over the plain current, corresponding to given boundary conditions, a current given by a distribution of sources having a density equal to the divergence and satisfying the boundary conditions. The method is applied to the case of a cylinder surrounded by a current both with and without rotation. In the second instance numerical examples have been carried out, demonstrating that the results are intermediate between the experimental figures found by Taylor and the theoretical ones obtained by Rayleigh.

Paper presented before the Società per il Progresso delle Scienze.

Airplane Performance

A Graphical Method of Calculating the Economical Velocity of an Airplane Taking the Wind into Account (Nota sul calcolo grafico della velocità economica di un aeroplano tenendo conto del vento), N. Galante. L'Aerotecnica, Vol. 12, No. 12, Dec. 1932, pp. 1606-1612, 5 figs.

IN ORDER to account for the influence of a side wind as well as head and tail winds in determining the economical speed of an airplane, the author develops a graphical means of calculating the velocities required for an airplane to maintain a course in the presence of a side wind of given intensity. For curves of minimum fuel consumption in relation to forward speed, he substitutes a curve for which, at any velocity of motion relative to the ground, there is a corresponding fuel consumption required to maintain the airplane on the course with a given side wind. Having obtained the fuel consumption curve, he then uses the well known method of Coffin to find the component of the economical velocity on the course, and, given the lateral wind, the relative economical velocity.

Do-X Flying Boat Design

Lessons of the Do-X, C. Dornier, Engineer, Vol. 155, No. 4032, pp. 406-407.

CERTAIN important points in the construction of the Do-X flying boat and their advantages or disadvantages in practice are dealt with by the designer. The author explains the necessity for changing from air- to water-cooled engines and points out the advantages derived from using twelve engines arranged above the wing. He considers that the system of storing fuel is capable of improvement and simplification if one is prepared to depart from the idea of special tanks and so construct the bottom of the boat that fuel is carried in the form of a double hull. He believes that, as a result of experience, certain parts of the hull as originally designed are considerably over-dimensioned and that in the future, by redistribution of material, without increasing the weight, it will be possible substantially to strengthen the whole of the hull.

Paper presented before the Royal Aeronautical Society.

Diesel Engines

Fuel Characteristics in Relation to Pump and Sprayer Action, LeMesurier and Stanfield. Engineer, Vol. 155, No. 4030, April 7, 1933, pp. 359-360, 11 figs.

RESULTS of experiments are described which were carried out at the research station of the Anglo-Persian Oil Co. at Sunbury to determine the effects of fuel characteristics on pump and nozzle action in Diesel engines. The experiments covered the relation between the rate of flow of oil through pipes and the determination of the loss of head due to this flow, examination of fuel pumps to find the minimum safe working head at the suction side for satisfactory operation and the effect of change of fuel on phenomenon in the delivery pipe between the fuel pump and nozzle.

It was found that under ordinary conditions the flow of fuel through pipes of the Diesel engine was streamline, and its resistance could be calculated with sufficient accuracy. The failures due to air locking of the main or auxiliary fuel pumps of a Diesel engine were likely to occur if total resistance to flow on the suction side exceeded the minimum fuel head. Leakage in the pumps and nozzles increased with decreasing fuel viscosity. For a series of fuels at a given temperature, the bulk modulus increased with specific gravity, but there was no definite relation between these two properties. Lag between the static timing of the fuel pump and commencement of injection from a nozzle was determined for a given pipe bore and engine speed and load by the length of the delivery pipe and fuel characteristics, especially viscosity.

Abstract of paper presented before the British Diesel Users Association.

Wing Flutter

Calculation of the Resistance Derivatives of Flutter Theory, Part I. W. J. Duncan and A. R. Collar. (British) Aeronautical Research Committee—Reports and Memoranda No. 1500, October, 1932 (published April 28, 1933), 14 pp., 2 figs.

THE CASE is discussed, where the airfoil has two independent oscillatory motions, namely, a pitch and a translation at right angles to the general direction of the motion. A complete set of derivatives is obtained which are the two-dimensional analogs of the flexural-torsional derivatives of the theory of wing flutter. It was found that values of all derivatives were influenced by the frequency of the oscillation and explicit formulas were also determined for the derivatives for the case of a non-oscillatory divergence.

Aileron Control

Experiments on the Reversal of Aileron Control Due to Wing Twist, W. J. Duncan and G. A. McMillan. (British) Aeronautical Research Committee—Reports and Memoranda No. 1499, July 16, 1938 (published May 2, 1933), 22 pp., 4 figs.

EXPERIMENTS are discussed which were undertaken to test the theoretical formulas derived to cover the loss of lateral control due to the wing twist which accompanies high-speed flight, and to investigate the effects of some modifications of the wing and aileron on reversal speed. It was found that the measured reversal speed for the wing without external bracing is in good agreement with that calculated by the Roxbee, Cox and Pugsley methods and with that deduced from known values of the flutter derivatives. For a range of variation of aileron hinge position, the change in the reversal speed was small. The reversal speed was highest when the aileron control operated at the inboard end of the aileron. Covering the aileron gap raised the reversal speed slightly.

The theoretical discussion led to the conclusion that the reversal speed is proportional to the square root of the torsional elastic stiffness of the wing; it is independent of the position of the flexural center, and it falls as the center of pressure of the aileron load moves aft.

Landing Gear

Determination of the Elastic Characteristics of Airplane Landing Gears (Sulla determinazione delle caratteristiche elastiche del congegno di atterramento degli aeroplani), R. Verduzio. L'Aerotecnica Vol. 13, No. 3, March, 1933, pp. 163-177, 8 figs.

CONSIDERING the elastic part of the landing gear as a spring without mass and the rest of the airplane as rigid, the author derives an equation for the vertical motion at landing and calculates the maximum work to be done by the elastic members as well as the impact factor on the basis of unit rigidity (or the rigidity of the elastic part divided by the mass of the airplane). He determines the velocity on the flight path just before landing in functions of the vertical speed, of the minimum speed of flight near the ground and of fineness ratio, and finds, as a function of the landing characteristic, which part of the airplane is still supported aerodynamically. He concludes with the relation between the impact factor, the landing characteristic and the unit rigidity, so that given two of the variables, the other may be found.

Airplane Wing Ribs

Calculation of the Ribs of Airplane Wings (Sul calcolo dellee centine delle ali dei velivoli), R. Verduzio. L'Aerotecnica, Vol. 13, No. 3, March, 1933, pp. 178-184, 2 figs.

IN CALCULATING the stresses on wing ribs, the author explains how these depend on the mutual connection between rib and spar as well as on the dynamic pressure. For the latter, he considers the balance of forces acting at a point on the contour of the rib where the threads of the warp and filling of the fabric covering cross over the rib plane. He determines the force perpendicular to the plane tangent at this point and the forces acting on it and lying respectively in the plane of the rib and on the normal to it, writing these forces in function of the dynamic pressure. He also discusses the stresses of spars due to the ribs.

Aerodynamics

Pressure and Frictional Drag of Cylinders for Reynolds Numbers of 5,000 to 40,000. (Druck- und Reibungswiderstand des Zylinders bei Reynoldsschen Zahlen 5,000 bis 40,000), L. Schiller and W. Linke, Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, No. 7, April 13, 1933, pp. 193-198, 13 figs.

IN THE RESEARCH described the purely frictional drag of cylinders was obtained for differences between the total and pressure drag for Reynolds numbers from 5,000 to 40,700 by means of measurements in a free jet. This resistance was found to be five per cent of the total drag for a Reynolds number of 5,000 and decreased to two per cent at 40,000. The Thom theory was thus confirmed. In the region where the boundary layer had not broken away, the pressure indication at a hole in the cylinder wall was in error by an amount proportional to the diameter of the hole and to the tangential pressure gradient. To the increase of the drag coefficient between the Reynolds numbers of 2,000 to 20,000, there was associated a progressive transformation of the dead-water region and an approach of the critical point on the cylinder which denoted an end of the laminarity of the mixing zone. Wires placed in the laminar transition zones made the latter artificially turbulent and caused a much more rapid transition into the region of the square-law resistance than in the case of a smooth cylinder.

Aerial Surveying

Air Survey, J. S. A. Salt. Royal Aeronautical Society Journal, Vol. 37, No. 267, March, 1933, pp. 209-219 and (discussion) pp. 219-226. 3 fig.

THE PRACTICAL TECHNIQUE of air survey is reviewed, and the important contribution it offers to survey problems in the British Empire is discussed. The author explains the general theory of stereoscopic pairs, plotting machines and the simplifications in the case of vertical photography and discusses the demands of the surveyor and characteristics desirable in an airplane designed for survey photographic work. He concludes with a proposal for developing an imperial survey organization, since experience has shown him that a private company, operating by contract, is not a suitable organization and that its deficiencies are only increased by a multiplicity of such companies.

Aeronautical Education

The National Aeronautical College in Paris (L'Ecole National supereure de l'Aéronautique a Paris), R. Lemaire Genie Civil Vol. 53, No. 11, March 18, 1933, pp. 245-249, 6 figs.

LAYOUT of the buildings and system of instruction followed at the National Aeronautical College of France are discussed. The author traces the history of its development from 1917, outlines the courses required and describes the wind tunnels and testing materials laboratories. The fundamental mathematics and physics are taken up in the preparatory year and the first year is devoted to a study of engines, aeronautical materials, structures and industrial physics, while the second covers the construction of airplanes and seaplanes, aero- and hydrodynamics, aerial navigation, relativity, financial, industrial and social economics, public and industrial relations, organization of factories and industrial hygiene.

Biplanes

Problems of the Biplane (Considerazioni sul problem del biplane), E. Pistolesi. L'Aerotecnica, Vol. 13, No. 3, March, 1933, pp., 185-193, 1 fig.

REVIEWING the theories of Ferrari, Millikan and Panetti regarding the biplane of infinite span, the author gives a new and simple demonstration of Millikan's theory, which substitutes for the wing a vortex and a doublet placed at the center of the wing section. He then suggests a simplification of the method which consists of placing the vortex and doublet on the focus. He indicates how it is possible to apply this method to determine the circulation on wings of a given infinite biplane, adopting the symbols used by Panetti and comparing the results with the Ferrari theory. The method shows the variation in the direction of zero lift of the two wing sections, part of which depends on the divergence of the biplane and the other on the curvature of the wing sections.

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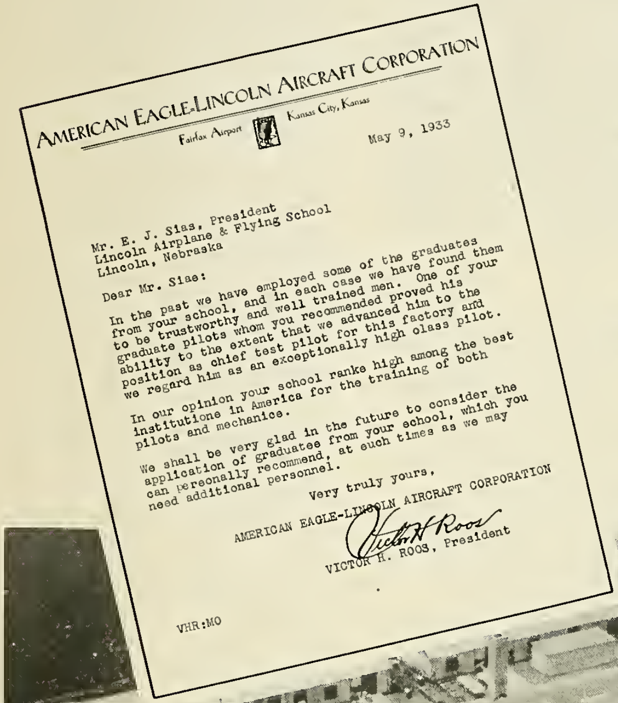

AMERICAN EAGLE-LINCOLN AIRCRAFT CORPORATION
Fairfax Airport Kansas City, Kansas

May 9, 1933

Mr. E. J. Sias, President
Lincoln Airplane & Flying School
Lincoln, Nebraska

Dear Mr. Sias:

In the past we have employed some of the graduates from your school, and in each case we have found them to be trustworthy and well trained men. One of your graduate pilots whom you recommended proved his ability to the extent that we advanced him to the position as chief test pilot for this factory and we regard him as an exceptionally high class pilot.

In our opinion your school ranks high among the best institutions in America for the training of both pilots and mechanics.

We shall be very glad in the future to consider the application of graduates from your school, which you can personally recommend, at such times as we may need additional personnel.

Very truly yours,

AMERICAN EAGLE-LINCOLN AIRCRAFT CORPORATION

Victor H Roos

VICTOR H. ROOS, President

VHR:MO

READ THIS LETTER
FROM
VICTOR H. ROOS
PRESIDENT OF THE
AMERICAN EAGLE
-LINCOLN
AIRCRAFT CORP.

Here's proof that Lincoln trained mechanics and pilots are preferred in the aviation industry . . . that the training they receive in this school leads to rapid advancement and rich success.

VICTOR H. ROOS
PRESIDENT
of American-Eagle-Lincoln Aircraft Corp. (Below) Aerial view of this prominent corporation's factory, Kansas City, Kansas.

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Twenty-three years of outstanding successful operation as a trade school and thirteen years as an internationally known aviation school, together with a reputation for graduating "top notch" mechanics and pilots has made Lincoln a world famous school. This adds prestige to Lincoln training. That's why Lincoln graduates are preferred.

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Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 1343 H St., N.W., Washington, D.C.

•

Airplane. Dominick A. Lucchese, San Francisco, Calif. (1,894,518)

Retractable landing gear. George W. De Bell, Farmingdale, N. Y., assignor to Aviation Patent & Research Corp. (1,894,582)

Aircraft with rotative wings. Juan de la Cierva, London, England, assignor to Autogiro Co. of America. (1,894,673)

Aircraft propulsion mechanism. Louis Balga, Bridgeport, Conn. (1,894,844)

Seaplane. Boris V. Korvin-Kroukovsky, Beechhurst, N. Y., assignor to Edo Aircraft Corp., College Point, N. Y. (1,894,919)

Aerial flare. Lee P. Johnson, commander, and Theodore P. Westfall, lieutenant commander, U. S. N., and Max W. Fischer, Washington, D. C. (1,894,954)

Propeller. Eugenio Macaluso, Turin, Italy. (1,895,043)

Airplane. Darrell L. Stage, Palo Alto, Calif. (1,895,140)

Airplane safety belt. Corydon M. Johnson, Farmingdale, N. Y., assignor to Aviation Patent & Research Corp. (1,895,222)

Drop cabin plane. Frank F. Love, San Antonio, Tex. (1,895,256)

Airplane. Tanase Gheorghe, Baltimore, Md. (1,895,388)

Brake for aircraft. Jules M. J. Dormoy, Paris, France, assignor to Westinghouse Air Brake Co., Wilmerding, Pa. (1,895,452)

Aircraft. Donald A. Hall, San Diego, Calif. (1,895,458)

Airplane brake. Joseph C. McCune, Edgewood, Pa., assignor to Westinghouse Air Brake Co. (1,895,478)

Sextant for aircraft. Albert F. Hegenberger, Dayton, Ohio. (1,895,510)

Dirigible aircraft. Garrette W. Peck, San Diego, Calif. (1,895,518)

Aircraft. Harold F. Pitcairn, Bryn Athyn, and Agnew E. Larsen, Huntington Valley, Pa., assignors to Autogiro Co. of America. (1,895,521)

Aircraft. John B. McPherson, 4th, Abington, Pa. (1,895,679)

Tail wheel construction. Arthur E. Raymond, Santa Monica, Calif., assignor to Douglas Aircraft Co. (1,895,682)

Airplane. George Vlahov, New York, N. Y. (1,895,871)

Driving arrangement for aircraft propellers. Jean B. Barnarou, Neuilly-sur-Seine, France. (1,895,874)

Storage of liquids in aircraft. Claude Dornier, Friedrichshafen, Germany. (1,895,976)

Parachute device. Stig O. C. Kuhlemann, Stockholm, Sweden. (1,895,999 and 1,896,000)

Device for training pilots in handling airplanes. William E. Huffman, Dayton, Ohio, assignor to Aircraft Appliance Co., Springfield, Ohio. (1,896,175)

Flying suit. Frank G. Manson, Dayton, Ohio. (1,896,183)

Engine cowling. Roland Chilton, Ridgewood, N. J., assignor to Wright Aeronautical Corp., Paterson, N. J. (1,896,222)

Tail wheel. Charles E. Hathorn, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,896,234)

Airplane. Theodore P. Wright, Port Washington, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,896,270)

Airplane wing construction. Pembroke A. Vaile, Chicago, Ill. (1,896,336)

Floating airport. Irving Kulik, Brooklyn, N. Y. (1,896,546)

Airplane propeller mounting. Edwin C. Larson, San Francisco, Calif. (1,896,730)

Aircraft control means. Edward M. Bertran, Baltimore, Md., assignor to Chas. M. Stieff, Inc. (1,896,999)

Sustaining rotor construction for aircraft. Juan de la Cierva, Madrid, Spain, assignor to Autogiro Co. of America. (1,897,042)

Aircraft with rotative wings. James G. Weir, London, England, assignor to Autogiro Co. of America. (1,897,092)

Beach landing gear. Gabriel Midroe, Dundalk, Md., assignor to General Aviation Corp. (1,897,269)

Airplane control apparatus. Anton L. Veit, San Francisco, Calif. (1,897,285)

Controllable-pitch propeller. Walter F. Stimpson, Detroit, Mich., and Murray K. Patten, Dayton, Ohio. (1,897,445)

Aircraft and screw propeller therefor. Rudolph Chillingworth, Brooklyn, N. Y. (1,897,463)

Propeller. John Squiers, Hagerstown, Md. (1,897,536)

Landing gear for dirigibles. Richard Thorpe, Mays Landing, N. J. (1,897,539)

Airplane. Alfred C. Loedding, Baden, Pa. (1,897,669)

Means for lighting airports. Thomas J. Rogers, Minneapolis, Minn. (1,897,768)

Rotary winged aircraft. Joseph S. Pecker, Philadelphia, Pa., assignor to Autogiro Co. of America. (1,898,097)

Aerial photography. Stuart Graham, Ottawa, Ont., Canada. (1,898,179)

Aircraft landing system. John A. Willoughby, Cambridge, Mass. (1,898,474)

Aircraft, especially of the amphibion type and body boat structure therefor. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,898,695)

Apparatus for changing the pitch angle of reversible-blade screw propellers. Milton D. Thompson, Fairhaven, Mass. (1,898,697)

Triple control means for landing-gear wheel brakes of airplanes. John T. Hughes, Chicago, Ill. (1,898,836)

Retarding gear for catapults. Colin C. Mitchell, Edinburgh, Scotland. (1,898,884)

Stabilizing device. William Chater, Denver, Colo. (1,899,079)

Aircraft having sustaining rotors. Agnew E. Larsen, Huntington Valley, Pa., assignor to Autogiro Co. of America. (1,899,096)

Airplane propeller. Raymond J. Norton, Washington, D. C., assignor to Bendix Aviation Corp. (1,899,631)

Propeller. William Stelzer, Chicago, Ill., assignor to American Propeller Co., Baltimore, Md. (1,899,650)

Parachute harness. Frank S. Wigley, London, and Leonard F. Austing, Bromley, England, assignors to Irving Air Chute Co., Buffalo, N. Y. (1,899,656)

Form-fitting parachute pack. William Bird, Buffalo, N. Y., and Guy M. Ball, Los Angeles, Calif., assignors to Irving Air Chute Co. (1,899,661)

Parachute apparatus, Louis J. Campbell, New York, and Lyman H. Ford and Harold G. Rogers, Buffalo, N. Y., assignors to Irving Air Chute Co. (1,899,668)

Propeller. George F. Houston, South Bend, Ind., assignor to Bendix Research Corp. (1,899,689)

Parachute pack. Erwin H. Nichols, Brooks Field, Tex., assignor to Irving Air Chute Co. (1,899,713)

Spar for airplanes. Willy Messerschmitt, Augsburg, Germany. (1,900,067)

Control mechanism for aircraft. Richard P. Mueller, New York, N. Y. (1,900,068)

Parachute projecting device for airplanes. Albert Lakehurst, Brooklyn, N. Y., assignor to Lakewood Comet Aero Advertising Co., Lakewood, N. J. (1,900,399)

Aircraft. Hugo Junkers, Dessau, Germany. (1,900,502)

Steering apparatus for aircraft. Waldemar Moller, Berlin-Charlottenburg, Germany. (1,900,516)

Air brake for airplanes. Giuseppe M. Bellanca, New Castle, Dela. (1,900,631)

Airplane wing. Frank G. Baum, San Francisco, Calif. (1,900,688)

Airship. Hans Strobl, Berlin-Tempelhof, Germany, assignor to Luftschiffbau Zeppelin G. M. B. H., Friedrichshafen, Germany. (1,900,743 and 1,900,744)

Propeller. Wallace M. Minto, Jersey City, N. J. (1,900,839)

Parachute mounting for airplanes. Theodore D. Crane, Council Bluffs, Iowa. (1,900,891)

Rotary winged aircraft. Paul H. Stanley, Glenside, Pa., assignor to Autogiro Co. of America. (1,901,132)

Dirigible airplane. Herman L. Kuhn, Union, Mass. (1,901,173)

Crankshaft. Earle A. Ryder, West Hartford, Conn., assignor to Pratt & Whitney Aircraft Co. (1,901,358)

Parachute equipment. Jacques C. G. Salone and Georges D. Lucas, Paris, France. (1,901,380)

Airplane landing wheel. Alger G. Maranville, Akron, Ohio, assignor to General Tire & Rubber Co. (1,901,759)

Airplane landing gear. Giuseppe M. Bellanca. (1,901,795)

Airship. Owen A. Havill, New York, N. Y. (1,901,809)

Ignition device for aircraft engines. Erich Klaiber, Stuttgart, Germany. (1,901,846)

Airplane wing construction. Giuseppe M. Bellanca. (1,901,864)

Revolving parachute. Kennet J. Girdwood, Montreal, Canada. (1,901,957)

Stabilizer adjusting mechanism. Charles E. Hathorn, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,902,071)

Rudder-pedal adjusting mechanism. George A. Page, Jr., Freeport, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,902,094)

Propeller. Fred A. A. Pearson, Valley Stream, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,902,096)

Machine gun mount for aircraft. Clem G. Trimbach, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,902,107)

Aircraft control means. Thomas B. Lavelle, Hempstead, N. Y. (1,902,133)

Hangar for airplanes and the like. James M. Webster, New York, N. Y. (1,902,205)

Windshield cleaner device for airplanes. Silas A. Morehouse, Los Angeles, Calif. (1,902,254)

Air mail pick-up and deposit mechanism. Louis P. Wulf, Lost Nation, Iowa. (1,902,391)

Airship. Wilfrid V. N. Powelson, New York, N. Y., and Warren Travell, San Bernardino, Calif. (1,902,519)

Apparatus for determining position of aircraft not visible with the naked eye. Johann Schier, Karl Petschenig and Anton Peinl, Vienna, Austria. (1,902,727)

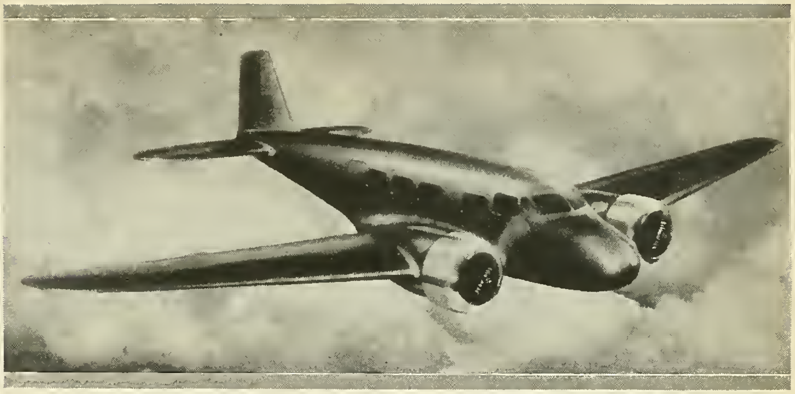
Wind indicator for airplane landing fields. Frank M. Czpiewski, Milwaukee, Wis. (1,902,763)

Metallic airfoil. Edwin A. Hughes, Seattle, Wash., assignor to Boeing Airplane Co. (1,902,956)

Flying machine. George F. Myers, New York, N. Y. (1,903,009)

Landing gear for aircraft. John Lloyd, Coventry, England, assignor to Sir W. G. Armstrong Whitworth Aircraft Ltd. (1,903,186)

Parachute. William J. Gleason, Houston, Tex. (1,903,213)



Photographic study of the new "Electra" as it will appear in flight

Lockheed "Electra" monoplane all-metal twin-engined transport

• Lockheed Aircraft Corp., Burbank, Calif., is developing a twelve-place bimotor transport that will offer a combination of economy with performance. Known as the "Electra," the model is designed to combine speed and comfort with low-cost operation and maintenance. It will provide generous cabin, cockpit and cargo space and is designed to cruise at 180 miles per hour with 2,200 pounds of pay load, powered by two engines giving a total of 840 horsepower. Important streamline developments and retractable landing gear are to be included in its all-metal construction. It is expected that the plane will be ready for delivery in the latter part of this year.

The full-sized soundproof cabin, measuring 58 inches wide by 60 inches high by 15 feet long, will incorporate many refinements and appointments. An efficient ventilating system, combined with a thermostatic heat control, will scientifically maintain proper cabin temperature and assure proper fresh air conditions. Lavatory facilities are to be provided at the rear of the cabin, and baggage space will total 68 cubic feet, 40 of which will be located in the nose ahead of the pilot's compartment, and a compartment of 14 cubic feet in each wing stub.

Good visibility will be possible from the pilot's cockpit, which is to be located forward. Conventional wheel controls are to be provided, with complete instrument equipment including Sperry directional gyro and Sperry artificial horizon. Provision will be made for the installation of complete two-way Western Electric radio. All electrical wiring on the ship is to be enclosed in a metal conduit system with conveniently located junction boxes. The type of landing gear to be used has already been tested out satisfactorily under service conditions.

The retractable landing gear is to be operated electrically and will have an auxiliary emergency hand-operated system. The wheels will swing directly back into the rear of the nacelle and are to be completely faired in when in the retracted position. The retracting system used will permit a variable fore-and-aft location of the wheels in extended position, so that the airplane may be more suitably balanced on the ground with various loading conditions. When the airplane is lightly loaded, with no passengers in the cabin, the wheels may be extended slightly forward to facilitate handling on the ground. Goodyear air wheels will be used with Goodyear hydraulic disc brakes, controlled by a hand lever conveniently located and differentially connected to the rudder pedals.

The construction of the plane will be all-metal, 24 ST being used throughout for structural parts and 24 ST Alclad for the skin. The wings are to be of semi-stressed metal skin type construction, readily accessible and repairable. Detachable wing panels will facilitate inspection and maintenance. Two fuel tanks of 100-gallon capacity each are to be located in the leading edge of the wing stub between the engines and the fuselage. The propellers will be far enough forward so that the propeller disc is a few inches ahead of the pilot's feet.

Simple wing flaps are to be incorporated, which will materially reduce take-off and landing speeds. With the flaps in operation, the gliding angle will be reduced from approximately 14:1 to about 8:1. Horizontal and directional balance will be accomplished with adjustable flaps located at the trailing edges of the rudder and elevators.

. NEW EQUIPMENT and METHODS .

Fairchild Five-Lens Aerial Camera

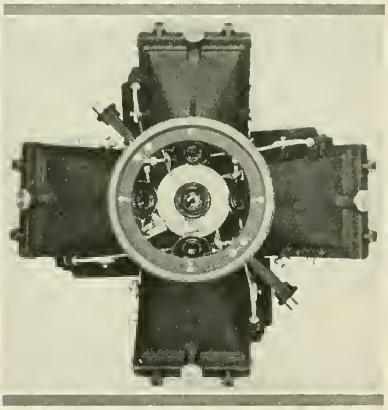
• THE FIVE-LENS aerial camera, designed and developed by the Fairchild Aerial Camera Corp., in cooperation with the Army Air Corps and Army Corps of Engineers, virtually has revolutionized the science of aerial photography as an aid to producing accurate maps and has given the United States world leadership in this department of chartography. Both the Army Air Corps and the Naval Bureau of Aeronautics are using this camera extensively. Results have been so satisfactory that the Geological Survey and the Coast and Geodetic Survey are having the Air Corps photograph larger areas.

The camera is really five cameras combined in one. The central camera or chamber takes a vertical photograph, and the other four cameras or chambers take oblique photographs. Each chamber has its own film magazine, accommodating sufficient film for approximately 200 exposures, but the film in all five is advanced simultaneously by a single film wind crank. The shutters of all five chambers are simultaneously tripped by means of a single-shutter trip lever. After the film is developed, the negatives exposed in the central (vertical) chamber are contact-printed, while those obtained in the four oblique chambers are rectified (horizontalized) and brought to the same scale as the contact print by means of the rectifying printer. This is accomplished with the Model B-7 transforming printer. There is a printer for each camera which has been carefully calibrated to transform the oblique exposures made with that particular camera. All prints are then trimmed on a special trimmer to dimensions obtained by calibration of the camera and are mounted in sets to form the final composite print.

Experience has shown that the most efficient angular scope for a multiple-lens camera is of the order of 140 degrees; that is, about 70 degrees on each side of the vertical. An increase in this angular scope adversely affects the sharpness of the photographic image, due to the large magnification when transformation is accomplished, and to the effect of aerial haze. On the other hand, decreasing the angular scope materially reduces the covering power of the camera. The T-3A camera, with its 140-degree angle, photographs a strip of territory over a mile wide for every 1,000 feet of flying altitude; in other words, flying at 20,000 feet, the camera covers a strip of terrain 20 miles wide.

The camera, which weighs 104 pounds, is the further development of the tri-lens camera, widely known by military authorities as the "Bagley" tri-lens, invented by Maj. James W. Bagley of the Engineers Corps some 16 years ago, using three lenses. It is the result of 15 years of research and experimental work by the Army Air Corps at Wright Field, Dayton, Ohio, in conjunction with the Corps of Engineers. The camera is regarded as the most accurate instrument of its kind ever built and at the same time simple to operate.

It is able to photograph a larger area in less time than any other camera. A series of photographs covering the entire state of Massachusetts was made in four days by Weld Arnold and Lieut. James F. Phillips, of the Staff of the Geographical Institute at Harvard University as a part of a course in aerial mapping conducted at that school. The Institute was founded by Dr. Hamilton Rice, explorer, and trains men for exploration field work. Recently, four Army officers, Captains Albert W. Stevens, D. M. Reeves, Bruce C. Hill and Lieut. Phillips, who were stationed at Wright Field, Dayton, Ohio, were given leave of absence to serve as instructors at the Institute. Twenty students, most of whom were Harvard undergraduates, accompanied Mr. Arnold and Lieutenant Phillips on the mapping flights in groups of four on each flight. They are members of "Geography 36," one of the popular courses at Cambridge.



Underside of the five-lens camera

The actual flying time in making photographs of the state was 24 hours and 40 minutes. Owing to the altitude at which the pictures were taken (almost three miles) oxygen was used to maintain efficient performance of the men in the plane.

Lieutenant Phillips used an ordinary commercial map of Massachusetts to plot his course, charting light lines twelve miles apart from north to south. Starting the first day from Boston, the plane proceeded to the western end of the state and flew back and forth, following those lines. Photographs were taken at intervals of approximately one minute each.

The photographs are expected to be of great value for such purposes as forestry work, engineering projects, construction, city planning, etc. For military missions the new camera is considered to be extremely valuable.

Treated Cloth Insulates Cables

• A CABLE insulated with Glyptal-treated cloth and capable of resisting oil and withstanding high temperatures has been developed by the General Electric Co. and is now available in all types. In addition to its ability to resist oil and heat, this new cable is characterized by unusual flexibility and toughness that enables it to stand severe mechanical strain.

The insulating material is a synthetic resin, produced from phthalic anhydride and glycerine, which is unaffected by mineral oil. Glyptal-treated cloth also maintains its original properties over long periods of time, even at high temperatures. Samples of cable insulated with this cloth have been exposed to temperatures of 100 degrees C. for periods of three to four months without showing appreciable deterioration. Glyptal-treated cloth retains its dielectric strength for a long time under compression, bending and abrasion.

Fireproofing Cotton Fabrics

• DEVELOPMENT OF a new process for fireproofing cotton fabric has opened another potentially large market for cotton, according to the Fireproof Fabrics Sales Corp. of Philadelphia, Pa. This process is designed to offer important economies to users of non-combustible fabrics for purposes now served by heavier and more expensive structural material.

In actual service under exacting out-of-door conditions, cotton canvas, treated by the new process, has proved its immunity from fire and its permanent retention of fireproof qualities. Exposure to rain and weather does not impair its fire resistance. The process is applicable to all kinds of cotton fabrics, from the lightest airplane cloth to the heaviest duck.

Electric Welding and Electrodes

• A DEVELOPMENT in arc welding, particularly suited to the joining of heavy plates, has been announced by the Metal & Thermit Corp. of New York, N. Y. Known as Murex Straight Gap welding, the process eliminates the need for "veeing" or grooving of plate edges. Plates may be used just as they come from the mill. Greater welding speed as well as reductions in cost are reported.

The company also has announced an addition to its line of Murex heavy mineral coated electrodes. The new unit, Murex Universal, is for use on mild steel and may be employed in either flat, vertical or overhead work. Smooth, clean deposits of unusually high tensile strength and ductility are obtained on any of these classes of work.

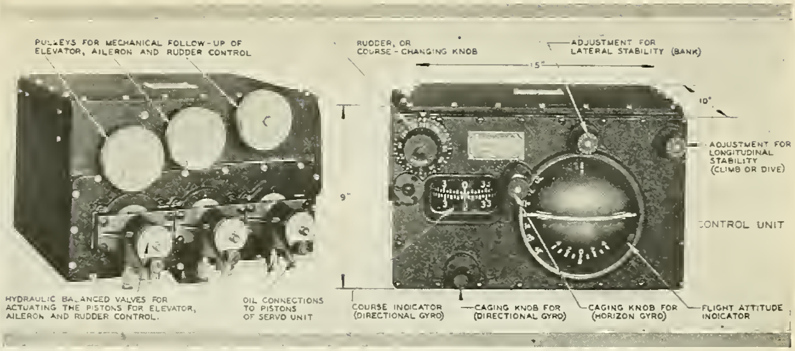
Shock-Absorbing Tail Wheel Unit

• A TAIL WHEEL UNIT with a shock-absorbing feature has been developed by the Bellanca Aircraft Corp., New Castle, Dela., and has been tested and placed in use on a number of the latest planes produced. Conventional airplane rubber shock cord is the shock-absorbing medium, and the unit is not affected by weather changes or mechanical difficulties. The combination of a forward-and-back motion, in addition to the vertical, accounts for its unusually efficient shock-absorbing action. The feature of the 360-degree-turning wheel is fully retained in this new unit.

Electric Fuel Valve for Fire Prevention

• AN ELECTRIC fuel valve developed by L. G. Riley, engineer of the Westinghouse Electric and Manufacturing Co., will automatically seal a plane's gasoline line when the ignition is turned off, reducing the danger of gasoline fires. The device reduces the possibility of fire by making a leakproof seal at the gas tank when the pilot cuts off his engine.

The valve consists of an inner steel core and a hollow outer tube which becomes an integral part of the gasoline line. Electricity passing through a coil of wire wound around the outer tubing exerts a magnetic pull upon the inner core piece and holds it open against spring pressure. When the pilot shuts off the ignition switch, the current to the electric valve is also cut off, and the inner core, no longer held by the pull of the magnet, is closed by the spring, sealing the tube and cutting off the fuel supply.


PULLEYS FOR MECHANICAL FOLLOW-UP OF ELEVATOR, AILERON AND RUDDER CONTROL
RUDDER, OR COURSE-CHANGING KNOB
ADJUSTMENT FOR LATERAL STABILITY (BANK)
15"
10°
9"
ADJUSTMENT FOR LONGITUDINAL STABILITY (CLIMB OR DIVE)
CONTROL UNIT
HYDRAULIC BALANCED VALVES FOR ACTUATING THE PISTONS FOR ELEVATOR, AILERON AND RUDDER CONTROL.
OIL CONNECTIONS TO PISTONS OF SERVO UNIT
COURSE INDICATOR (DIRECTIONAL GYRO)
CAGING KNOB FOR (DIRECTIONAL GYRO)
CAGING KNOB FOR (HORIZON GYRO)
FLIGHT ATTITUDE INDICATOR

Sperry Automatic Airplane Pilot

• THE SPERRY Automatic Airplane Pilot is designed to relieve the human pilot of the manual labor required to control an airplane in flight, maintaining directional, lateral and longitudinal stability for indefinite periods. Manufactured by the Sperry Gyroscope Co., Inc., of Brooklyn, N. Y., the device has been installed in the Lockheed Vega, *Winnie Mae,* in which Wiley Post is reported to be planning a solo flight around the world.

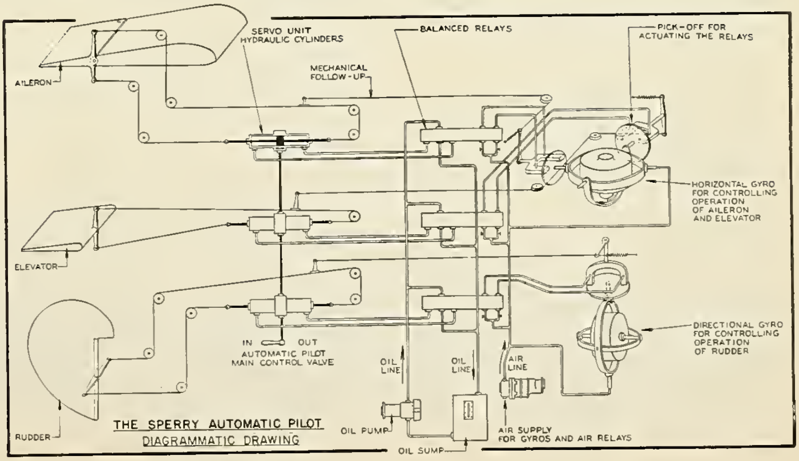
Maneuvers such as properly banked turns, flat turns, climbs and glides may be made through remote adjustments introduced manually by the pilot. Variable rates of control can also be made by the pilot.

The Sperry pilot is composed of two principal units, the gyro control and the servo unit. The gyro control unit is mounted in the instrument panel and provides visual indications of bank, pitch and direction similar to the Sperry blind flight instruments, the artificial horizon and directional gyro. The gyro unit and the servo unit provide the horizontal, vertical and directional datum lines from which the airplane is automatically controlled and in addition serve as attitude indicators during manual as well as automatic piloting. The weight of the entire equipment is approximately 80 pounds.

The gyros are air-driven, and together with the air relays, require six cubic feet of air per minute at four inches of vacuum. The air is provided by an engine-driven vacuum pump or can be supplied by venturis. Hydraulic valves, operated directly by the air relays, are also a part of the control unit, and they in turn operate the pistons which are directly connected to the three controls. Turns of 360° and 45° banks and 45° climbs or dives can be made through remote control knobs on the face of the unit. Caging devices are also provided for both gyroscopes.

The hydraulic cylinder servo unit is mounted convenient to the control cables of the plane. This unit is connected to the control unit by the oil lines and follow-up cables. A bypass valve, which is operated by a lever convenient to the pilot, engages or disengages the auto-control. An engine-driven oil pump, delivering three gallons per minute at 25 to 200 pounds' pressure, provides the power to the three pistons through the gyro-controlled oil valves in the control unit.

United Air Lines is installing one of the automatic pilots on one of the new Boeing Wasp-powered twin-engined transport planes. Provision has been made on all 60 of the new transports so that automatic pilots can be installed.


THE SPERRY AUTOMATIC PILOT
DIAGRAMMATIC DRAWING

SERVO UNIT HYDRAULIC CYLINDERS
BALANCED RELAYS
PICK-OFF FOR ACTUATING THE RELAYS
AILERON
MECHANICAL FOLLOW-UP
HORIZONTAL GYRO FOR CONTROLLING OPERATION OF AILERON AND ELEVATOR
ELEVATOR
DIRECTIONAL GYRO FOR CONTROLLING OPERATION OF RUDDER
IN
OUT
AUTOMATIC PILOT MAIN CONTROL VALVE
OIL LINE
OIL LINE
AIR LINE
RUDDER
OIL PUMP
OIL SUMP
AIR SUPPLY FOR GYROS AND AIR RELAYS

THE AIR SERVICES

Mackay Trophy for Indians' Rescuers

THE DISTINCTION of having made the most meritorious flight in the Army Air Corps during 1932 has been awarded to members of the 11th Bombardment Squadron for transporting food and supplies to snowbound Navajo Indians early last year. Six planes of the squadron, which was based at March Field, Calif., dropped about fifteen tons of food to the Indians, who were isolated in their settlements in Arizona and New Mexico, saving thousands of them from starvation. Lieut. Charles H. Howard, commander of the squadron, has received the trophy as representative of the group because of the impracticability of naming individual participants in the flight.

Anniversary of NC-4 Flight Observed

THE FOURTEENTH ANNIVERSARY of the first flight by an airplane across the Atlantic Ocean, that of the Navy Curtiss seaplane NC-4, was marked last month. The flight was made from Newfoundland to the Azores on May 16-17, 1919, and after a delay reached Plymouth, England, via Lisbon, Portugal, on May 27. The 1,380-mile distance from Newfoundland to the Azores was covered in a little over 15 hours, and the 800-mile flight from the Azores to Lisbon was made in 9 hours, 25 minutes. Lieut-Comdr. A. C. Read was in command, and Lieut. Walter Hinton was pilot during the flight, which was made by a crew of five men.

Private Farley Receives Cheney Award

PVT. ARDEN M. FARLEY was presented by President Roosevelt recently with the Cheney Award for 1932. The award is given for the outstanding act of valor, self-sacrifice or extreme fortitude in a humanitarian interest in connection with flying in the Army Air Corps or Air Corps Reserve. Private Farley, who is in the 94th Pursuit Squadron, heroically rescued Lieut. William H. Dum of the Air Corps Reserve from a burning plane last year.

San Antonio Engineering Shops

THE ENGINEERING Shops Building at the San Antonio (Tex.) Army Air Depot was completed recently under the direction of Capt. A. F. Dershimer, constructing quartermaster for San Antonio and vicinity.

The structure, which is of fireproof, one-story construction, is approximately 458 by 572 feet overall and covers seven acres under one roof. The construction is of brick, structural clay tile, structural steel, cast stone and reinforced concrete, with metal lath and plaster, steel windows, steel truss, concrete, built-up steel deck and asbestos-protected metal roofing, concrete floors and ramps. It comprises the shops building, the dope house, the boiler and utilities house, with two connecting bays, and the paint, oil and dope storeroom.

Work has been begun on the three new quartermaster buildings at the depot, the warehouse and maintenance building, the garage and the fire station.

Army Blind Flying Group Is Graduated

THE FIRST class of Army Air Corps pilots to complete a course in blind flying, including blind take-offs and landings, was graduated recently at Dayton, Ohio. Capt. Albert F. Hegenberger was instructor of the group, which comprised Maj. F. H. Coleman and Lieutenants G. V. Holloman, S. E. Prudhomme, R. J. Minty, C. D. McAllister and L. F. Harman.

Naval Planes End Long Flight

THIRTY flying boats returned to the Naval Air Station at Pearl Harbor, Hawaii, recently after 500-mile hops to and from French Frigate Shoals. The flight was made as part of training operations and included a survey of the area in the vicinity of the Shoals.

Classes for Air Corps Clerks

PLANS have been made for a new course in the Air Corps Technical School, Chanute Field, Rantoul, Ill. It is to be officially designated as the Course for Air Corps Supply and Technical Clerks, and establishment of the course was ordered by the Chief of the Air Corps, under authority of the Adjutant General, due to the great need of the clerks in the service.

The first course will commence on or about July 3 and will be of about five months' duration. It will not be included under the administration of any of the four existing departments of the school but will be under the direction of an individual director. Each class, of which there will be two each year, will consist of twenty students. The entire course of instruction will be devoted to training of specialized technical clerks, and no effort will be made to train the students in personnel or organization paper work.

Flying Cadets Plan Reunions

A MOVEMENT for annual reunions of former members of the Flying Cadet battalion has been started by the July and October classes at Randolph Field, Tex. October 12 has been officially designated as organization day of the cadet battalion, and that date has been selected for the reunion. All former students, including those who were not graduated, will be eligible to attend.

King Takes Naval Air Chief's Post

REAR ADMIRAL ERNEST J. KING assumed his duties as chief of the Bureau of Aeronautics on May 3, succeeding the late Rear Admiral William A. Moffett. After being sworn in, Admiral King made the following statement:

"In assuming the duties so ably performed for so many years by the late Admiral Moffett, I fully realize that no one can actually fill the place that was peculiarly his in Naval aviation, at home and abroad.

"While the pioneer work of developing Naval aviation was so largely Admiral Moffett's, as was his the enthusiasm and vision that did so much to bring aviation its present high position in the Fleet, there remains plenty to be done to keep things going along the lines he had mapped out—enough and to spare to absorb the time and energies of all those who are now to carry on in Naval aviation.

"I am confident that the record and tradition of achievement and progress in Naval aviation will continue."

New Boeing Pursuits to Fly Soon

THE FIRST of 111 all-metal, low-wing, Wasp-powered pursuit planes being built by the Boeing Airplane Co. for the Army Air Corps will be flown next month, according to an announcement by Boeing officials. Work on the fleet of new-type fighters is progressing rapidly, with tooling completed and production parts being turned out. Designated as the P-26A, these low-wing fighters will be of semi-monocoque construction and will be externally braced. Each will be powered by a 525-horsepower supercharged Wasp.

Marines Acquire Ambulance Plane

THE BELLANCA Aircraft Corp. recently delivered to the Marine Corps at Quantico, Va., a specially developed ambulance plane, using the Bellanca Skyrocket model as a basic design. Provisions were made in the cabin so that two standard aircraft litters could be carried in addition to pilot and attendants. One door was made considerably larger than standard in order easily to accommodate the litters, and the interior of the ship was finished in keeping with its purpose. The delivery of this plane, known as the RE-3, marks the third Skyrocket type to be acquired by the Navy Department.

Hamilton Field Prepared for Use

THE ARMY'S new bombing base at Hamilton Field, Calif., costing $6,000,000, will be garrisoned beginning this summer. When finished, the field will be a base for one headquarters squadron, one service squadron and two bombing squadrons.

(Continued on following page)

"CORSAIRS"

ARE NO LONGER MERELY EYES OF THE FLEET » » » THEY HAVE BECOME AN EFFECTIVE STRIKING FORCE AS WELL » » »

CHANCE VOUGHT CORPORATION

SUBSIDIARY OF UNITED AIRCRAFT AND TRANSPORT CORPORATION

(Continued from preceding page)

Sunnyvale Station Named Moffett Field

THE NAVAL AIR STATION at Sunnyvale, Calif., was named Moffett Field last month by Secretary of the Navy Swanson in memory of the late Rear Admiral William A. Moffett.

Air Corps in Extensive Maneuvers

OHIO, Kentucky and the Pacific Coast were the scenes last month of Army Air Corps maneuvers involving hundreds of airplanes and thousands of members of the personnel. Brigadier General Oscar Westover directed the war games in California, which were scheduled to continue for three weeks, commencing about May 8. The Ohio and Kentucky sections in the vicinity of Cincinnati were involved in field combat trials of "blue" attack forces under Brigadier General H. C. Pratt against Fort Knox, Ky., which was defended by "red" forces commanded by Brig. Gen. J. R. Lindsey. These maneuvers, which opened for a two-week period May 14, included the "destruction" of Cincinnati from the air, accomplished on the first day of the combat.

Air Corps Orders Ten More Airbuses

AFTER delivery of the first order of four Bellanca Airbus transports to the Army Air Corps, and after testing of their efficiency, service and load-carrying ability, a contract has been executed for ten more planes of the same type. The additional ships are to be powered with the Pratt & Whitney geared Hornet engines of 650 horsepower. An extra large, double-hinged cabin door and sturdy floor construction permit engines to be rolled into the cabin for fast transportation to other points. The cabin equipment includes hooks and straps for installation of litters when it is desired to use the planes for ambulance work.

Flying Marine Gunner Is Honored

A SPECIAL LETTER of Commendation from the Secretary of the Navy was presented recently to Marine Gunner Albert S. Munsch for service in the Nicaragua Squadrons, West Coast Expeditionary Force.

Army Non-Rigid Airship Passes Tests

PRELIMINARY TESTS on the largest non-rigid type airship constructed in this country were completed recently, prior to its delivery to Langley Field, Va., which will be the operating base while extensive tests are conducted to determine its suitability for coast patrol operations. Known as the TC-13, the Army airship is over 200 feet long and has a displacement of approximately 11 tons, of which $4\frac{1}{2}$ tons are available for the useful load in the form of crew, equipment, fuel and armament.

Although this airship is a non-rigid type, it is of such size that it was possible to provide a large number of special features and accommodations that are usually to be found only in the larger rigid types. Facilities for the preparation of meals in flight have been made, along with sleeping quarters and all necessary accommodations for the crew of six men during extended flights of four or five days.

The car, which is over 40 feet long, is suspended directly beneath the envelope, and all the wires which support the car are contained within the envelope. The bottom of the car is constructed in the form of a boat to permit landing on the water, and for this purpose a sea anchor, which in reality is a large, inverted, canvas umbrella, is being developed and will eventually be included as part of the airship's equipment for flights over water.

A small sub-cloud observation car may be lowered from the airship by a flexible cable that contains a telephone line which makes it possible for the observer in the sub-cloud car to communicate with the crew in the airship and direct its maneuvers during certain weather conditions. This car will also lend itself to a number of special forms of observation and photographic work and will be the object of experiments to be conducted at a later date. The car is of wooden construction, streamlined, and painted in such a manner as to harmonize with the color condition to be expected in a dark, cloudy sky. For raising and lowering the sub-cloud car, a small power-driven windlass is installed in the airship car, which is capable of raising the sub-cloud car with the observer at a rate of 200 feet per minute. The lowering of the car can be accomplished without the use of the engine, but special automatic brakes have been installed to limit the rate of descent. It is also possible to raise the car by hand operation of the windlass in case of engine trouble.

The airship is powered by two 375-horsepower geared air-cooled engines, mounted on outriggers extending out from the sides of the car. Walkways are provided on these outriggers to permit access to the engines for inspection or minor adjustments during flight.

Twelve-foot-diameter propellers are installed on the engines, which are geared in such a manner that the propellers will turn at a comparatively slow speed; this feature, in combination with the special mufflers on the engines, results in a very quiet power plant installation.

Besides the two engines used for propelling the airship, three small marine-type outboard engines are utilized for driving various items of special equipment installed in the car. One of these small engines is used for driving an air blower to supply air to the ballonets in the envelope, by means of which the pressure and shape of the envelope are maintained. Under ordinary operations the air for maintaining pressure in the envelope is obtained from air scoops installed in the slipstream of the propellers, so that this small power-driven blower is only an auxiliary provision for supplying the air. Another small engine is used for driving an auxiliary radio generator installed in the car and can be used as a source of energy for radio communication when the airship is on the ground or water and the regular radio generator is inoperative. The third small engine is the one used on the windlass for raising and lowering the sub-cloud observation car.

The latest-type long-range two-way radio communication equipment is installed, as well as special direction-finding equipment and all other navigational instruments required for operations over water. Provision has also been made for armament, both bomb racks and machine gun mounts having been built into the car.

Another feature is the fuel and water ballast tank installation; the fuel tanks when empty may be filled with water ballast to maintain the ship in equilibrium at all times. Water is obtained by an apparatus that is dropped into the ocean while the airship is flying at a reduced speed and is then raised up into the car and pumped into the empty fuel tanks.

A special portable type mooring mast, set on wheels and drawn by a tractor, similar in design to those employed for handling the large rigid type airships is under development and will be used for maneuvering the TC-13 airship in and out of the hangar. The mooring mast will be attached to the bottom side of the envelope, midway between the nose and the car.

The ship was constructed by the Goodyear-Zeppelin Co. of Akron, Ohio. It was designed by the Air Corps Materiel Division at Dayton, Ohio.

Pioneer Parachute Jumper Honored

THE DISTINGUISHED FLYING CROSS was presented to Master Sgt. Ralph W. Bottriell, 68th Service Squadron, Kelly Field, Tex., recently by Brig. Gen. Charles H. Danforth, commanding general of the Air Corps Training Center.

Sergeant Bottriell was awarded the Flying Cross for having made the first parachute jump from an Army airplane with the "free-type parachute" in May, 1919. Prior to his jump the only type parachute used by the Army was an attached type, which opened as soon as the jumper left the plane. As a result of Sergeant Bottriell's jump, the Army uses the present type parachute. Sergeant Bottriell, in charge of the Kelly Field Parachute Department, has made over 700 parachute jumps from airplanes and balloons.

AERONAUTICAL INDUSTRY

American Air Race Circuit Schedule

A SERIES of air shows that will include a number of important cities in the United States during the summer and fall is being conducted by the American Air Race Association, an outgrowth of the Chicago Air Race Corp., which is staging the American Air Races in Chicago, July 1-4.

Several acrobatic and speed fliers, parachute jumpers and pilots with specialized acts compose the list of performers who are taking part in the circuit shows. Among them are John Livingston, racing pilot; Arthur J. Davis, speed and stunt flier; Betty Lund, woman acrobatic pilot; Frank Faulkner, who demonstrates an autogiro; Marcellus King, racing pilot; George Burrell, Jr., who stunts a Ford trimotor; Bob Moore, who flies a pusher plane in a comedy act, and Clem Sohn and Bill Wagner, parachute jumpers, who perform delayed drops of over a mile.

The first show on the circuit was held in Forth Worth, Tex., last month. The Oklahoma City show followed. Springfield, Mo., and Tulsa, Okla., were to have shows at the end of the month.

Future dates are listed as follows: Enid, Okla., June 1; Wichita, Kans., June 3 and 4; Kansas City, Mo., June 9-11; Omaha, Neb., June 16-18, and Minneapolis, Minn., June 23-25. In between these week-end shows, several one-day shows are scheduled.

Following the American Air Races at the Chicago Municipal airport July 1-4, the circuit performers, augmented probably by several pilots taking part in the Chicago races, will move eastward, including numerous other cities, swinging back into Chicago and later visiting several southern cities.

The circuit is being operated by the American Air Race Association, Inc., of which Maj. R. W. Schroeder is president; Winsor B. Williams, vice president and general manager; John B. Story, vice president; Frank McKay, secretary, and Howard H. Wikoff, treasurer. Headquarters of the association are at the Hotel Sherman, Chicago.

Air Meet at Meriden, Connecticut

THE MERIDEN (Conn.) Aviation Booster Club is planning an air meet at the Meriden Municipal Airport on June 22, or June 23 in case of rain. There will be a clam chowder party for visiting pilots and participants preceding the meet. Aside from the flying events, five-meter radio demonstrations are scheduled for the meet.

Aircraft Manufacturers to Meet

A CONFERENCE with manufacturers of aircraft, to be held July 27, has been called by the Aeronautics Branch of the Department of Commerce for the purpose of discussing proposed changes in the Airworthiness Requirements of Air Commerce Regulations for Aircraft, Aeronautics Bulletin No. 7-A, it was announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The meeting is to be held at 10 a. m. in the Department of Commerce Building, Washington, D. C.

Coming Events

German Air Sport Exhibition at Stuttgart, Germany. (JUNE, continued from May.)

Air show at Enid, Okla., under the auspices of the American Air Race Assoc. (JUNE 1.)

Aeronautical exhibit at A Century of Progress Exposition, Chicago, Ill. (JUNE 1-NOV. 1.)

Air show at Wichita, Kans., under the auspices of the American Air Race Association. (JUNE 3 & 4.)

Air Show at Kansas City, Mo., under the auspices of the American Air Race Association. (JUNE 9-11.)

International aeronautic meet at Brussels, Belgium. (JUNE 11.)

International airplane contest at Angers, France. (JUNE 11.)

Soaring camp at Elmira, N. Y., under the auspices of The Soaring Society of America. (JUNE 12-JULY 10.)

Air touring festival, under the auspices of the Aero Club of France. (JUNE 15-18.)

Air show at Omaha, Neb., under the auspices of the American Air Race Association and the Omaha Air Race Assoc. (JUNE 16-18.)

French Private Aviation Day. (JUNE 18.)

Air meet at Meriden, Conn., under the auspices of the Meriden Booster Club. (JUNE 22.)

Air show at Minneapolis, Minn., under the auspices of the American Air Race Association. (JUNE 23-25.)

Fourteenth Royal Air Force display at Hendon Aerodrome, England. (JUNE 24.)

Annual meeting of the American Society for Testing Materials at The Stevens, Chicago. (JUNE 26-30.)

Semi-annual meeting of The American Society of Mechanical Engineers at the Palmer House, Chicago, Ill. (JUNE 26-30.)

Balloon ascent into the stratosphere by Lieut. T. G. W. Settle at Chicago under the direction of Prof. Auguste Piccard. (JULY.)

German Air Sport Exhibition at Munich, Germany. (JULY.)

Merseyside Aviation Display at Liverpool Airport, England. (JULY 1.)

American Air Races at Chicago, Ill., municipal airport, under the management of the Chicago Air Race Corp. (JULY 1-4.)

National Air Races of 1933 at Los Angeles, Calif., municipal airport. (JULY 1-4.)

National meeting of the Ninety-Nines at the St. Francis Apartment Hotel, Hollywood, Calif. (JULY 3.)

Air races at Findlay Airport, Findlay, Ohio. (JULY 4.)

Dedication of American Legion Dale Jackson Airport, Faribault, Minn. (JULY 4.)

Dedication of the Norfolk-Tidewater Airport at Norfolk, Va. (JULY 4.)

Sectional charity air meet at Atlanta, Ga., under the auspices of the Amateur Air Pilots' Association. (JULY 9.)

Fourth Annual National Soaring Contest at Elmira, N. Y. (JULY 10-23.)

International aeronautic rally at Dieppe, France. (JULY 15.)

Air race meet at Detroit, Mich., planned in connection with the Michigan Air Tour. (JULY 15-16.)

International aeronautic rally on the Belgian coast. (JULY 22-24.)

Conference of Aeronautics Branch, Department of Commerce, and aircraft manufacturers at Washington, D. C., to discuss proposed changes in airworthiness requirements for aircraft. (JULY 27.)

German Air Sport Exhibition at Hamburg, Germany. (AUGUST.)

First English international air races for airplanes at the Portsmouth and Southsea Airport, Portsmouth, England. (AUG. 4, 5 and 7.)

International Automotive Engineering Congress of the S.A.E. at the Palmer House, Chicago, Ill. (AUG. 28-SEPT. 4..)

Gliding competition at Banne d'Ordanche, France. (AUG. 30-OCT. 3.)

Sectional charity air meet at Indianapolis, Ind., under the auspices of the Amateur Air Pilots' Association. (SEPTEMBER.)

Sectional charity air meet at Springfield, Mass., under the auspices of the Amateur Air Pilots' Association. (SEPTEMBER.)

International air meet and Gordon Bennett Balloon Race at Chicago, Ill., in connection with A Century of Progress. (SEPT. 1-4.)

Essex Aviation Display at Hillman's Aerodrome, Romford, England. (SEPT. 9.)

Dedication anniversary program, including air races and aerial demonstrations at Indianapolis (Ind.) Municipal Airport. (SEPT. 9-10.)

American Legion air meet at Chicago, Ill. (SEPT. 30-OCT. 8.)

National charity air pageant, under auspices of Judson Health Center, Emergency Exchange Association and Amateur Air Pilots' Association at Roosevelt Field, N. Y. (OCT. 7-8.)

German Air Sport Exhibition at Hanover, Germany. (NOVEMBER.)

International aeronautic rally at Cairo, Egypt. (DECEMBER.)

Preparing to Leave for Los Angeles

FORTY or more special racing planes are being newly built or completely redesigned and rebuilt to enter the various free-for-all races on the program of the 1933 National Air Races at Los Angeles Municipal Airport, Calif., July 1-4. Cash prizes for the free-for-all events and the Bendix Aerol and Thompson Trophy races will total $50,000, according to Clifford W. Henderson, managing director of the races.

J. R. Wedell has built an entirely new plane around a high-powered engine. In addition to his new racer, Wedell plans to enter his Wasp-Junior powered Wedell-Williams racer again, and is putting the finishing touches on a six-cylinder Menasco-powered speed job for the 550 cub. in. races.

Russell Boardman has rebuilt the wing of his Wasp Junior Gee Bee No. 7 and has added wing flaps to reduce its landing speed and make it a better cross-country job. In addition, he has completely overhauled the No. 11 Gee Bee for participation in both the Shell Dash and Thompson Trophy race events.

Among the new racers is an amphibion recently completed by Maj. Alexander de Seversky. The Seversky job is a low-wing all-metal amphibion, powered with a supercharged Pratt & Whitney Wasp.

Another Bendix Thompson entrant will be the Laird Solution, in which the late Charles W. ("Speed") Holman won the first Thompson Trophy race at Chicago in 1930. Purchased by Arthur D. Knapp, wealthy sportsman of Jackson, Mich., the Solution has been completely redesigned and rebuilt and will be flown by Mr. Knapp in the 1933 races. The rebuilt Solution has plywood wings with a new airfoil section, a new 625-horsepower high-compression Wright Whirlwind R-975 engine with high blower gear ratio, and a specially designed Smith controllable-pitch propeller. Every part has been streamlined.

A plane of unusual design developed by William L. Jamieson, Eastern Air Transport pilot, at Richmond, Va., will be powered with a 12-cylinder, Vee-type Curtiss engine.

An entirely new plane in the 375 cu. in. class has been built by Arthur C. Chester of Joliet, Ill. This is a special racing monoplane, powered with a four-cylinder Menasco C-4 engine.

S. J. Wittman of Oshkosh, Wis., has again entered his Cirrus-powered low-wing racer in which he won the 350 cu. in. free-for-all at Cleveland last year. Further to increase its speed, Mr. Wittman has clipped off some of the wing and has "suped up" his motor. Ben Howard's Gipsy-powered *Pete*, which followed as a close second last year, has been purchased by Joe Jacobson of Kansas City, and is being prepared for entry in the 375 cu. in. races.

The Keith Ryder, *Miss San Francisco R1*, powered with a four-cylinder Menasco, will be seen in the 375 and 550 cu. in. free-for-alls, with a new racing pilot, George O. Hague, at the controls. The plane, recently purchased by Charles F. McGrew of Los Angeles, is being completely overhauled at Clover Field, Santa Monica, under the direction of Mr. Hague, who operates a flying school at that field. The Menasco has been supercharged to develop 185 horsepower at 2,500 r.p.m. Another Keith Ryder, *Miss San Francisco R2*, powered with a six-cylinder Menasco, will also be seen in this year's races with either Bob Clampett or Ray Moore at the controls. Like the R1, the R2 has a duralumin-covered fuselage, plywood-covered wing and retractable landing gear. Last year the R2, flown by Ray Moore, won the Frank B. Phillips trophy race at 182.22 miles per hour.

Two new jobs, built last year but not ready for the National Air Races, include a Menasco-powered low-wing racer built by Alden Brown of San Francisco (Lee Schoenhair, pilot) and another built by Gordon Israel of Overland, Mo.

In the 200 cu. in. class, several planes will appear with motors as low as 35 horsepower. In this group will be the *Tilbury-Fundy Flash*, powered with a 45-horsepower engine. Fully loaded, this plane weighs only approximately 500 pounds.

Manufacturers May Test Own Engines

AIRCRAFT ENGINE manufacturers having suitable testing equipment now may conduct tests of engines for Department of Commerce type approval at their factories, if they so desire, instead of submitting them to the testing laboratory of the Aeronautics Branch.

Tests made by a manufacturer on his own engine testing equipment will be witnessed and certified to by designated Department of Commerce inspectors. All of the specifications given in the Department of Commerce Airworthiness Requirements for engines and propellers will still apply to these factory tests.

• Digest of Recent Events •

NORTHWEST AIR CIRCUS IS HELD

Over thirty commercial and Naval pilots of the Northwest took part in an air circus at the Mueller-Harkins Airport, Tacoma, Wash. (APRIL 30.)

POLISH FLIER CROSSES SOUTH ATLANTIC

Capt. Stanislaus Skarzynski, Polish pilot, arrived at Maceio, Brazil, after a solo flight in a Gipsy Moth monoplane across the South Atlantic from San Luis, Senegal. The distance of about 2,140 miles was flown in 17 hours, 50 minutes. (MAY 8.)

AIRSHIP FINISHES PERNAMBUCO FLIGHT

The *Graf Zeppelin* ended its first trans-Atlantic crossing of the year on its regularly scheduled service from Friedrichshafen, Germany, when it landed at Pernambuco, Brazil. (MAY 9.)

EUROPE-BRAZIL MAIL RECORDS BROKEN

Air mail records from Europe were exceeded, when mail carried by the *Graf Zeppelin* to Pernambuco, Brazil, arrived at Buenos Aires, Argentina, 4½ days after leaving Friedrichshafen, Germany. The mail was carried from Pernambuco to Buenos Aires in a Condor Syndicate plane. (MAY 11.)

MARYSE HILZ RETURNS TO PARIS

The French aviatrix, Maryse Hilz, completed a 25,000-mile solo flight from Paris to Tokio and return. The flight was made in a Rhone-Gnome powered Farman monoplane. (MAY 14.)

MERMOZ RECROSSES SOUTH ATLANTIC

Jean Mermoz with five others landed at Dakar, French Africa, after a flight across the South Atlantic in the Couzinet *Arc-en-Ciel* from Natal, Brazil. The trip was made at an average of 186 kilometers per hour, slower than his record westbound crossing, made in January, because of engine trouble. (MAY 15.)

INTERNATIONAL CONFERENCE CONVENES

Attended by representatives from many countries, the International Conference of Private Air Law was opened at Rome, Italy. (MAY 15.)

LINDBERGH ANNIVERSARY OBSERVED

Celebration of the sixth anniversary of the New York-Paris flight by Charles A. Lindbergh was featured by a French flier's re-acting of the landing of the *Spirit of St. Louis* at Le Bourget Field, France. Coinciding with the observance, the Couzinet *Arc-en-Ciel*, piloted by Jean Mermoz, arrived at the field on its return from South America. (MAY 21.)

VANCOUVER CELEBRATES AVIATION WEEK

Aeronautical programs, an air pageant and a visitors' day at the airport were scheduled features of Aviation Week at Vancouver, British Columbia, under the auspices of Vancouver aeronautical organizations, the airport management and commercial operators. (MAY 22-28.)

Preparations for July Chicago Races

THE AMERICAN AIR RACES, which will be held in Chicago July 1-4 inclusive, have attracted an early entry list composed of some of the nation's best known pilots. An elaborate program, designed to make the four-day July meet in Chicago one of the outstanding aviation events of the year, is being mapped out by Maj. R. W. Schroeder, director of events. The meet is under management of the Chicago Air Race Corp. composed of the same group of aviation, civic and business leaders who conducted the 1930 air races in Chicago.

Arrangements are being made to handle a quarter-million spectators during the four days. The Century of Progress is drawing many persons into Chicago. Furthermore, the municipal airport, where the races are to be held, is inside the city limits and is served by excellent transportation. Admission prices are reported to be the lowest in the history of any air meet of national importance.

Prize money totaling $6,500 for A. T. C. planes has been scheduled for the four-day program, while a number of free-for-all races will be announced. The prize money is placed in escrow thirty days prior to the opening of the races.

Every person holding a Department of Commerce pilot or mechanic license of any grade will be admitted to the meet without charge.

Aviation Exhibit at World's Fair

MODERN airplanes and an exhibit of pioneer airships and famous historical planes will be seen in the aviation building at A Century of Progress in Chicago this summer. This aeronautical feature of the World's Fair is being supported by a group headed by Col. Frank Knox, publisher of *The Chicago Daily News,* and will be arranged by Maj. Ray Cooper.

How the modern, multi-motored air liner is built, materials and structures of cabins and wings and equipment for the comfort and enjoyment of passengers, will be shown in planes that visitors may pass through and inspect and in exhibits of details of interiors and accessories.

Personal planes, touring and sport models will be shown. There will be a large exhibit of model airplanes, and two model plane contests will be staged, sponsored by the American Legion and the Junior Chamber of Commerce.

Visitors may enjoy the sensations of flying and "stunting" in captive airplanes mounted on steel framework. A group of these will be installed in the exterior exhibit space. They are open-cockpit planes with propellers and controls, like flying planes except the large wings. The propellers turn at 1,800 revolutions per minute, operated by electric motors. Lectures on plane operation and demonstrations will be given by expert pilots, and visitors may climb into the cockpit and try for themselves the experience of flying a plane. The captive planes are capable of rolls, complete 360-degree loop, inverted flight and other stunts.

In the historical exhibit will be the Model "B" Wright machine, the first commercial model built by the Wright Brothers after the birth of practical aviation in their experimental Model "A." Near the Model "B" will stand a Bleriot monoplane, a plane of the same date as that in which Louis Bleriot in 1909 made the first flight over the English Channel.

The Laird plane of 1913, in which Kathrine Stinson, pioneer girl exhibition aviator, flew over China and Japan in 1915, will be another exhibit.

Trans-Atlantic flight will be represented by the Bellanca plane, *Columbia,* in which Clarence D. Chamberlin flew to Berlin in 1927 and which crossed the Atlantic in 1930, piloted by Capt. J. Erroll Boyd.

A "Jenny," the JN-4 type in which American aviators trained for the World War, will head a military exhibit comprising Spad, Nieuport, Fokker and Sopwith models.

The first autogiro brought to this country by Cierva also will be among the exhibits. The Roosevelt Field Museum at Mineola, L. I., N. Y., and the Smithsonian Institute at Washington, D. C., are cooperating to make the historic exhibits complete.

A collection of trophies that have marked the history of flight will be among the famous planes. Included in them will be the Curtiss seaplane trophy, held by the U. S. Navy; the Pulitzer Speed Trophy, won by Lieut. Cyrus Bettis, and the Edsel Ford reliability trophy. The first, second and third Gordon Bennett Balloon Race trophies, the latter two held by America, will be among the collection.

The main Air Show Building, designed by Architect George H. Buckley of Chicago, will be 250 feet long and 100 feet deep, built of corrugated aluminum as a type of airport building. On its top will be a semi-globe dome of glass and a promenade deck. The dome will be equipped with a powerful revolving horizontal beam of the airport beacon type, using colored lights. The inside ceiling of the Air Show will be an illuminated airline map of the United States. Innovations in spectacular lighting will be used for the first time in the Air Show Building by Curtis Lighting, Inc.

Zenith Radio for Aircraft

THE ZENITH Radio Corp., Chicago, has introduced a seven-tube radio receiver for aircraft use. Although designed originally for use in automobiles, the set has proved efficient for aircraft.

Chicago Lighter-Than-Air Events

INVITATIONS to participate in the Gordon Bennett balloon race at Chicago, Ill., Sept. 1-4 have been sent to the official aviation bodies of thirty-two countries. The international competition for the Bennett trophy will be held in conjunction with the International Air Races at the Curtiss-Reynolds Airport. The meet, which is to be conducted under the auspices of A Century of Progress and is sponsored by *The Chicago Daily News,* will pay at least $35,000 in cash prizes, according to Col. William P. MacCracken Jr., head of the N. A. A. contest board.

Lt.-Comdr. T. G. W. Settle, U. S. N., will defend the Bennett trophy for the United States, having won it last year when he piloted the Navy balloon from Basle, Switzerland, to a point northeast of Vilna on the Latvian-Polish border. Earlier in the summer he will make an ascension into the stratosphere under the direction of Prof. Auguste Piccard.

The stratosphere flight, which is sponsored by A Century of Progress, *The Chicago Daily News* and the National Broadcasting Co., is scheduled for July. Either Professor Piccard or his twin brother, Jean, will be with Commander Settle in the cylindrical car when the balloon takes off from the fair grounds. Stronger and lighter balloon and gondola equipment and a hydrogen capacity twenty-five per cent greater than equipment used in Professor Piccard's record-breaking flight last year will be employed in the Chicago ascent.

It is planned that the heavier-than-air racing program at Chicago, September 1-4, will follow the same airplane size groupings as established for this year's National Air Races at Los Angeles. In accord also with the precedent set by the National Air Races this year, where competition will be centered upon free-for-all races for specially-built racing craft, it is planned that the airplane events at Chicago will be free-for-all competition.

Omaha to Have Air Races This Month

FOR THE THIRD successive year, Omaha, Neb., is to have an air show of major size at its municipal airport, under the auspices of the Omaha Junior Chamber of Commerce, to be held June 16-18. The show will be furnished by the American Air Race Association, and will include events scheduled by that group for their Chicago races.

The show again is to be arranged in the name of the Omaha Air Race Association, subsidiary corporation of the Junior Chamber, of which the directors are President M. M. Meyers, Vice President Verne W. Vance, Secretary Treasurer Crawford Follmer, A. J. Rhodes, Hayden W. Ahmanson, Rudy Mueller, Paul Selby and A. L. Jacobberger.

North American Officers Elected

ERNEST R. BREECH has been elected chairman of the board of directors and president of North American Aviation, Inc., as well as chairman of the executive committee, following a reorganization of the company. He is also general assistant treasurer of General Motors Corp. and chairman of the board of directors of Eastern Air Transport, Inc.

Other officers elected by North American Aviation, Inc., include Richard W. Robbins and Thomas B. Doe, vice presidents; Lisle R. Beardslee, secretary and treasurer, and Joseph J. Mehl, assistant secretary and assistant treasurer. Among the directors are: George N. Armsby, Ernest R. Breech, LaMotte T. Cohu, J. Cheever Cowdin, Thomas B. Doe, Henry B. du Pont, Fred J. Fisher, Lindsey Hopkins, Charles F. Kettering, Robert Lehman, N. S. Ludington, Roland Lord O'Brian, E. A. Pierce, Richard W. Robbins, James M. Schoonmaker, Jr., Daniel M. Sheaffer, John Thomas Smith, Edward R. Stettinius, Eugene E. Thompson, James C. Willson and Charles E. Wilson.

The executive committee consists, besides Mr. Breech, of Messrs. Armsby, Cohu, Cowdin, Doe, Robbins, Schoonmaker, Sheaffer and Stettinius.

Alfred P. Sloan, Jr., president of General Motors Corp., has announced that General Motors Corp., as a result of action taken by the stockholders of General Aviation Corp. and North American Aviation, Inc., has become the dominating factor in North American Aviation, Inc., and its wholly owned subsidiaries. These are General Aviation Manufacturing Corp., B/J Aircraft Corp. and Eastern Air Transport, Inc. North American Aviation, Inc., also has substantial interests in the Douglas Aircraft Co., Inc., and Transcontinental Air Transport, Inc. Last month North American announced that it now holds over fifty-one per cent of the common stock of Western Air Express Corp.

McMullen Chosen for Florida Post

APPOINTMENT of Maj. A. B. McMullen as chief engineer of the aviation division for the State Road Department of Florida has been announced by Chairman C. B. Treadway. Major McMullen has been connected with aviation for the past fifteen years and until recently was president of the McMullen Airways Corp. of Tampa. He will now devote his full time to the promotion of the aviation industry in Florida, to the rendering of advice and engineering service to cities and counties and to the selection and construction of emergency landing fields throughout the state.

At the present time there are twenty-five airports within the state in the process of construction or major expansion. A definite system of airways has been laid out covering the entire state, and a systematic arrangement of fields along these airways is being developed.

Pitcairn Establishes New York Office

THE PITCAIRN Autogiro Co. has opened an office, mainly for sales purposes, at 10 East 40th Street, New York, N. Y. Robert E. Lees will be in charge.

New Waco Licensed as Seaplane

THE 1933 CABIN WACO on Edo Model 3300 floats recently received an Approved Type Certificate as a seaplane after tests at the Edo Aircraft Corp. base. The Waco was licensed for a gross weight, as a seaplane, of 3,250 pounds, which gave it a useful load of 1,171 pounds on floats.

North Central Air Officials Meet

TAXATION and uniformity of regulation were the principal topics discussed at the first regional meeting of the north central section of the National Association of State Aviation Officials at Bismarck, N. D., May 1 and 2.

Airway Beacon Lamps Ordered

THE WESTINGHOUSE Lamp Co., Bloomfield, N. J., has received an order from the Department of Commerce for 996 Mazda airway beacon lamps of the 1000-watt, 115-volt type. It is understood that they are for use on airways in Texas and the Southwest in installations of the new double-end 36-inch airway beacons.

Sensenich Propellers Approved

H. M. SENSENICH of Sensenich Brothers, Lititz, Pa., has announced that Approved Type Certificates have been granted to that company on the propellers they produce for the following models of engines: Salmson 40-horsepower, Continental A-40 and Szekely 35-horsepower and 45-horsepower.

United Reports Quarterly Income

UNITED AIRCRAFT & Transport Corp. reported net income for the first quarter of 1933 as $432,170.90, after providing for taxes, depreciation and minority interest. This, after deducting $112,500 for preferred dividend requirements, equals fifteen cents per share on 2,086,550 shares outstanding at March 31.

Flight Over Land May Be a Trespass

AT A MEETING of the American Law Institute last month it was voted to include, in restating the law of torts, a provision that a trespass on land may be committed by entering or staying above the surface of it. However, it was also provided that such an entry is privileged by a person traveling in an aircraft if the flight is made in a reasonable manner and for a legitimate purpose and is conducted at a height that will not interfere unreasonably with the land owner's enjoyment.

Aeronautical World's Records Revised

SIMPLIFICATION of world's air records have been made by the Fédération Aéronautique Internationale, which has also reduced the major records to seven. At the time the ruling was made, in the early part of April, the following major records were recognized:

Altitude: Prof. Auguste Piccard and Max Cosyns, Switzerland, Aug. 18, 1932; 16,201 meters (53,152.726 feet), in free balloon.

Speed: Flight Lieut. G. H. Stainforth, Great Britain, Sept. 29, 1931; 655 kilometers per hour (406.997 m.p.h.), in Vickers Supermarine S6B, powered with Rolls-Royce "R".

Duration (with refueling): John and Kenneth Hunter, United States, June 11-July 4, 1930; 553 hours, 41 minutes, in Stinson Detroiter, powered with Wright Whirlwind.

Duration (without refueling): H. Kaulen, Germany, Dec. 13-17, 1913; 87 hours.

Distance (straight-line): Russell N. Boardman and John Polando, United States, July 28-30, 1931; 8,065.736 kilometers (5,011.8 miles), in Bellanca monoplane, powered with Wright J-6.

Distance (returning to point of departure, with refueling): Lieutenants Lowell H. Smith and J. P. Richter, United States, Aug. 27-28, 1923; 5,300 kilometers (3,293.26 miles), in D. H. 4b, powered with Liberty 400-h.p.

Distance (returning to point of departure, without refueling): Lucien Boussoutrot and Maurice Rossi, France, March 23-26, 1932; 10,601.480 kilometers (6,587.442 miles), in Bleriot 110, powered with Hispano-Suiza 500-h.p.

Franklin Institute Medals Presented

THE HOWARD N. POTTS Medal was presented last month by the Franklin Institute, Philadelphia, Pa., to Igor I. Sikorsky of the Sikorsky Aviation Corp. of Bridgeport, Conn., in consideration of his pioneer work and inventions in the development of multi-motored airplanes, including amphibions and the largest combined planes for land and water service, and of his method of direction control of a multi-motored machine by the use of an automatic stabilizer.

A Crosson Medal was given to Juan de la Cierva of London, England, in consideration of the original conceptions and inventive ability which have resulted in the creation and development of the autogiro.

A Franklin Medal was awarded to Dr. Orville Wright of Dayton, Ohio, in recognition of the investigations carried out by him and his brother, Wilbur, from which they obtained the first reliable scientific data concerning the principles of flight and the design of airplanes, upon which they constructed their first airplane.

(Continued on following page)

A NEW AUTOGIRO

THE **KELLETT** K-4

●

MORE SPEED

GREATER CRUISING RANGE

INCREASED COMFORT

IMPROVED FLYING QUALITIES

BETTER APPEARANCE

●

Full information on this new model and special color designs gladly furnished on request.

NEW INCOME

FOR COMMERCIAL PILOTS

Write for details on Kellett Giro Sky Ads—a new, effective, and profitable advertising plan consisting of a banner towed behind an autogiro. There is immediate profit in it for you.

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AUTOGIRO CORPORATION

ATLANTIC BLDG. • PHILA.

AUTOGIROS HAVE FLOWN OVER 2,000,000 MILES

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OPPORTUNITY FOR SCHOOLS, AIRPORTS, ETC.

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Johnson Waxing Station

● Every plane stationed or landing at your field is a prospect for this new and valuable service — protecting planes with genuine Johnson's Wax (auto and airplane). We are now establishing dealers and waxing stations throughout the country — and invite you to write for full information about this new profit opportunity.

● Planes that are protected with wax look new and shiny — glowing with the rich wax polish. Owners are proud of their beautiful appearance. Yet the chief advantage of the wax is the way it shields wing and fuselage surfaces against the destructive action of sun, rain, wind, sleet, dirt and grease. It adds life to the plane, increases the safety factor — makes cleaning a simple operation, because dirt and grease are easily wiped off the hard, waxed surface. Also, the wax adds M. P. H. to the plane's performance.

● You can sell the wax — and do the waxing. Big profit possibilities in both. Write at once for details, or send in the coupon.

DISPLAY THIS SIGN

This sign at your hangar will sell waxing jobs for you. It is part of our merchandising help. You will see it at places like Bennett Field, New York City — Cleveland Municipal Airport — Ashburn Field, Chicago.

Let us WAX *your Plane*

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S. C. Johnson & Son, Inc., Dept. AD-6, Racine, Wisconsin

Please send me full dealer information. I am interested in establishing an authorized waxing station for planes.

Name ____________________

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City ____________ State ____________

(*Continued from preceding page*)

Longren Firm Alters Organization

ALL executive authority of and for the Longren Aircraft, Inc., Kansas City, Mo., was vested in Henry C. Huiskamp, vice president and general manager, and Wallace T. Backus, assistant general manager, at a directors' meeting of the company May 2. Albin K. Longren remains as president and also has accepted the position of consultant engineer. Paul M. Hewitt is sales manager.

The Longren company has received a purchase order from the Materiel Division of the Army Air Corps for a fuselage. This will be sent to Wright Field to undergo tests.

Amelia Earhart Awarded Harmon Prizes

THE HARMON International Aviatrix Trophy for 1932 has been awarded to Mrs. Amelia Earhart Putnam in recognition of her solo trans-Atlantic flight last year. She also was awarded the National Aviatrix Trophy for the United States. Other winners of the Harmon yearly awards for 1932 included Prof. Auguste Piccard, holder of the world's altitude record; Capt. Wolfgang von Gronau, 'round-the-world flier, and Capt. Ernst A. Lehmann, Zeppelin expert.

National awards for American fliers were made as follows: Aviator's Trophy, Col. Roscoe Turner; medals of honor, Lieut. T. G. W. Settle, Lieut.-Comdr. Charles E. Rosendahl and Warren D. Williams.

Pilots Show Increase Over Last Year

A TOTAL of 18,457 pilots and 7,004 aircraft held active Department of Commerce licenses on April 1, according to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. On April 1, 1932, there were 17,628 licensed pilots and 7,476 licensed aircraft.

The total number of aircraft, licensed and unlicensed, of which the Department had record on April 1, 1933, was 9,086.

Among the 18,457 persons holding pilots' licenses as of April 1, 1933, there were 7,053 of the transport grade, 1,158 limited commercial, 26 industrial, 10,122 private, and 98 solo pilots. The licensed pilots included 599 women, whose licenses were divided as follows: Transport, 59; limited commercial, 39; industrial, 1; private, 499, and autogiro, 1.

Licensed gliders numbered 63, and unlicensed gliders, 855, making a total of 918. Licensed glider pilots totaled 197.

Peper to Head Metropolitan Group

ELECTION of W. S. Peper as chairman for the metropolitan section of the Society of Automotive Engineers for the coming year was announced at the regular meeting May 18. Mr. Peper, who was vice chairman of aeronautic activities this year, has been closely connected with airplane and automobile activities.

Other officers elected include W. E. John, vice chairman; C. H. Baxley, secretary; C. F. Scott, treasurer; A. Farnsworth, head of marine activities, and Clarence D. Chamberlin, head of aviation activities.

More Curtiss-Wright Shares Listed

THE NEW YORK Stock Exchange last month approved an application of the Curtiss-Wright Corp. for the listing of 500,000 additional shares of $1 par common stock upon notice of the issuance of the shares. Sale of 50,000 shares of the common stock for $137,500 was authorized May 12 by directors of the company, which adopted a resolution offering the sale of 450,000 more common shares up to December 1 at $2.75 a share.

Inn Dedicates Aviators' Shrine

THE MISSION INN at Riverside, Calif., recently dedicated as part of the Inn the St. Francis Chapel, a shrine for aviators. This shrine will contain aviation medals, insignia, and replicas of medals and trophies awarded to aviators who have distinguished themselves in flying.

Montana Aeronautic Group Is Organized

PLANS for a charter service and training school with headquarters at the Shelby, Mont., municipal airport by a group of northern Montana men were announced recently. A cross-country plane capable of traveling at 120 miles per hour and a light two-place trainer were to be bought by the group, which has been organized to form a corporation. Among special trips to be made, several flights to the World's Fair at Chicago are planned. Flying schools will be conducted by Lieut. Bob Jellison, a member of the company, at Cut Bank, Shelby, Conrad and Havre, Mont.

Kellett Sky Ads Agents Announced

TWELVE authorized representatives and licensees for Kellett Giro Sky Ads were appointed recently. These autogiro operators, who use either Pitcairn or Kellett giros, have already executed contracts for over fifty firms in various parts of the country. The Sky Ads display consists of a sky banner specially developed by the Kellett company for use with the autogiro.

New Sperry Company Organized

THOMAS A. MORGAN has resigned as vice president and director of Eastern Air Transport, Inc., to assume the presidency of the new organization, The Sperry Corp. Holdings of North American Aviation, Inc., in Sperry Gyroscope Co., Inc.; Ford Instrument Co., Inc.; Intercontinent Aviation, Inc., and Curtiss-Wright Corp. have been segregated in The Sperry Corp. Voting trust certificates, representing all the stock of The Sperry Corp., are to be held by stockholders of North American Aviation in a ten-year voting trust.

Kellett K-4 Autogiro Announced

KELLETT Autogiro Corp., Philadelphia, Pa., has completed the design of its new K-4 model, which supersedes last year's K-3 model, 210-horsepower Kinner-engine giro.

The K-4 model is powered with a 210-horsepower Continental engine. New-type fixed wings, eliminating the upturned tips and incorporating both sweep-back and dihedral, are used. A new undercarriage, considerably reducing head resistance and cleaner in appearance, is included in the K-4.

Top speed is 120 miles per hour, compared with 110 for the previous model. Cruising range has been increased to 350 miles, and other features have been added for the comfort and convenience of pilot and passenger. The new model is a side-by-side, two-seater, open-cockpit, or can be converted to a cabin top.

Breese Aircraft Officers Elected

JAMES H. LYNCH, for the past two years executive vice president of the Breese Aircraft Corp., was elected president of the company at a recent meeting in Portland, Ore. Fred F. Pittock and Frank P. Tebbetts, Portland business men, were elected to the board of directors.

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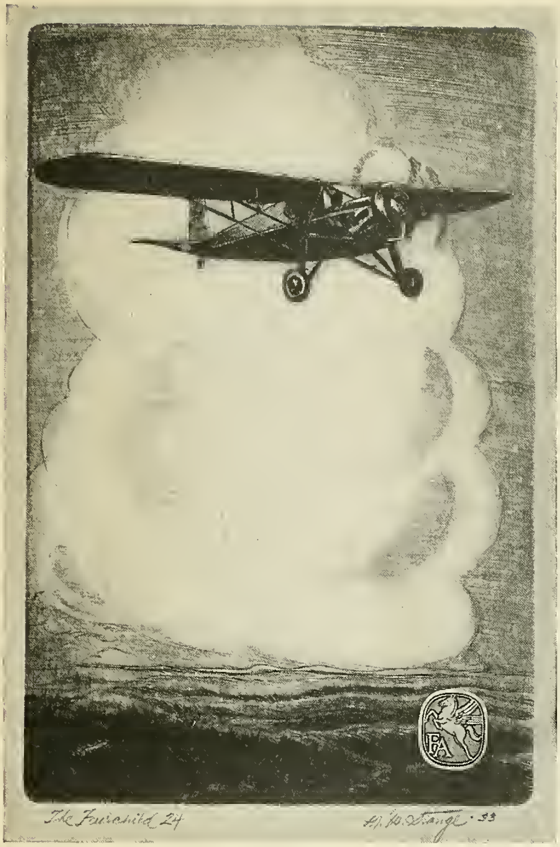

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PERSONAIRLITIES

(Continued from page 22)

versity his country called, and he went leaping by horse or train to enlist in the Aviation Section of the Signal Corps, U. S. Army, as a flying cadet. This happy event happened to the United States in January, 1918. But upon looking the lad over, the Army came to the conclusion that Ohio needed him a while longer, so they sent him to the Ohio State University School of Military Aeronautics, where the instructors wrestled with him from May until August, 1918. By that time he was completely saturated with education and military aeronautics, so he was shipped to Camp Dick, Dallas, Tex., where he languished through August and September, 1918. These are very trying months in which to languish in Dallas; even such hardened and sunburned Texan languishers as Major Bill Long, president of Dallas Aviation School and Air College, finds the going a trifle warm in August. He wears a cap with the initials D. A. S., meaning, I suppose, Damp And Sunburned.

Warren Carey finally flew to Eberts Field, Lonoke, Ark., during October, November and December, 1918. Lonoke, Ark., was a considerable distance from the Front, and Warren never did shorten that distance. It wasn't his fault that the Army spent so much time on his education that they left him no time in which to enter the conflict. Rather annoyed at them, he abandoned aviation for mechanical engineering with the Goodyear Tire and Rubber Co. of Akron, during 1919 and '20, when the call of the wild, or possibly Horace Greeley's advice, sent him to Los Angeles as engineer with the Union Oil Co.

The opening of Clover Field, Santa Monica, as an Army Reserve Flying Field in 1923, caught the almost-warrior off his guard, and the first thing he knew he had applied for a Reserve Commission. He is now a Captain, Air Reserve, and if we have another war before he grows too feeble, the country may get a return on its investment. Meanwhile he sells oil and gasoline to the Army, and then uses it up for them in their airplanes.

It was in 1928 that Carey became aviation representative for Union Oil Co. of California. He has flown the company's planes a total of a quarter of a million miles to date throughout the United States, Canada and Mexico, participating in all air tours, air meets and airport dedications on the Pacific Coast. He has a cabin up in the mountains back of Pasadena that he built himself. It is about half a mile off the road and up a narrow trail. He has a fireplace, running water and every convenience. Here he and his friends hold forth nearly every week-end.

• TRADE LITERATURE •

Sperry Horizon and Gyro

• TWO IMPORTANT PRODUCTS of Sperry Gyroscope Co., Inc., of Brooklyn, N. Y., are described, and their use and performance are explained in an eighteen-page booklet issued by the company and entitled "Flying with the Sperry Horizon and the Directional Gyro." Photographs and outline drawings aid in the exposition of the devices, and considerable space is given to an explanation of their operating principles and construction. The Sperry system of flight control and the use of the directional gyro in conjunction with the radio beacon also are discussed. (11)

Material for Aircraft Fittings

• CATALIN, one of the newest solid synthetic materials, is discussed in a booklet published by its manufacturer, American Catalin Corp. of New York, N. Y. The material, which may be used for aircraft instrument boards, control levers, knobs and similar fittings, is described as a cast synthetic resin, combining the sparkle and lustre of a precious stone with the toughness and strength of metal. It can be machined and worked like brass or hard wood and is made in rods, sheets, tubes and castings.

The product is described as non-inflammable, odorless, non-porous, practically moisture-proof, requiring no seasoning, resistant to alcohol, oils and common acids, having a high dielectric, tensile and compressive strength, holding its shape and color and non-deteriorating. It is made in over seventy-five standard colors and in new colors upon short notice when desired. (12)

Air Insurance News Letter

• SUGGESTIONS for the promotion of aeronautical progress are contained in News Letter No. 28 of the engineering department, Aero Insurance Underwriters, New York, N. Y. The letter advocates rewards and the encouragement of competition among hangar employees, rather than threats of punishment, in insuring good work. Attention is called to the advantage of using de-icers for safety of flying under icy conditions. Another part of the letter describes the methods by which Professor Piccard solved the problems of maintaining air-tightness and keeping warm on his record-breaking altitude flight last year. (13)

American Airways New Route

• AN ATTRACTIVELY ILLUSTRATED leaflet issued by American Airways gives details concerning the new route of the airline from New York to Chicago via the Delaware Water Gap, Scranton, Elmira, Buffalo and Detroit. The folder describes features of the new service and includes interesting pictures of scenes along the route, including air views of New York at night, the Delaware Water Gap and Niagara Falls. (14)

Publication on Electrodes

• NUMEROUS APPLICATIONS of inorganic flux-coated welding electrodes are discussed in a booklet that is published by the Metal & Thermit Corp., 120 Broadway, New York City, which earlier introduced Murex heavy mineral coated electrodes. The booklet describes the welding of mild steel and boiler plate, stainless steel alloys, manganese steel, high-carbon steel and stainless iron. The repair of castings and heavy parts also is covered in this booklet. (15)

Colloidal Graphite Lubrication

• A TECHNICAL BULLETIN issued by the Acheson Oildag Co., Port Huron, Mich., discusses the mechanics of lubrication with colloidal graphite. The booklet describes in particular the absorption of colloidal graphite particles in oil and their effect upon lubrication.

A later bulletin of the company concentrates on the subject of colloidal graphite as a high-temperature lubricant. The graphoid surfaces formed when colloidal-graphited lubricants are used are described as having a low friction coefficient, being unusually resistant to oxidization and acting as protective coatings on the friction sections. (16)

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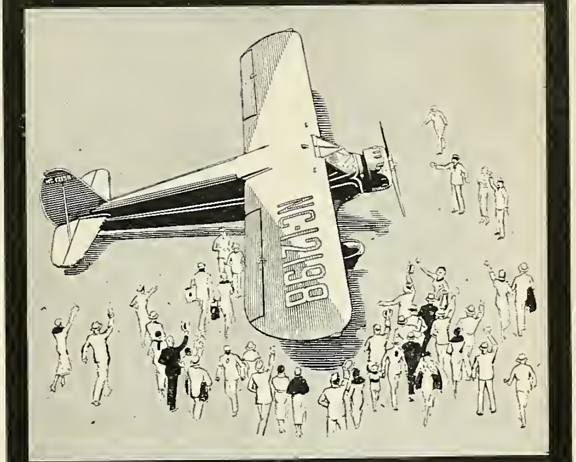

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NOTES ON TAKE-OFF

(*Continued from page* 18)

For completeness, certain fundamental formulas and parameters used in propeller analysis are included below:

Thrust coefficient = C_t = effective thrust/ρn^2D^4

Power coefficient = C_p = input power /ρn^3D^5

Propulsive efficiency = η = eff. thrust × velocity/input power

Speed coefficient = $C_s = .638V/n^{.4}bhp^{.2}$

In the last formula, V is in m.p.h., n is the r.p.m. and b.h.p. is the power.

Nondimensional parameter $J = V/nD$.

When V is expressed in m.p.h., n in r.p.m. and D in feet,

$J = 88V/nD$

Thrust = $T = 375\ bhp \times \eta/V$ where V is in m.p.h.

$T = 2\pi QC_t/DC_p$ where Q is the engine torque

Using an assumption that the torque remains constant, we write $bhp/n = bhp_m/n_m$ = const. where index m indicates rated b.h.p. and r.p.m. Consequently, $T = bhp_m\ C_t/n_mDC_p$

The following approximate formulas give the essential characteristics of a standard propeller operating at its peak efficiency. These formulas, however, should not be used for a high blade setting, the limiting angle being about 24°. Making a tip speed correction, one must carry the percentage correction through the whole range and not only at maximum V/nD.

Propeller diameter = $D = 325P^{.25}/n^{.5}V^{.25}$

Blade setting at .75R = $\alpha = 4° + 20J_m$ where index m indicates the high speed condition

$C_{sm} = .30 + 1.55J_m$

$\eta_m = 1.55J_m/C_{sm}$

Relative efficiency for any value of J is expressed as follows:

$\eta = (J/J_m)\ [1.9 - .9J/J_m]$

Speed power coefficient at any value of J/J_m can be expressed as $C_s/C_{sm} = (J/J_m)^{(1+.2J/J_m)}$

It is possible now, with the aid of some of the above formulas, to express C_t/C_p as a function of J_m and J/J_m:

$C_t/C_p = \eta_m\ (1.9 - .9J/J_m)\ /J_m$

It was shown before that the thrust can be expressed as $T = P_mC_t/n_mDC_p$. Substituting for C_t/C_p ratio the expression $\eta_m\ (1.9 - .9J/J_m)/J_m$, we have $T = P_m\eta_m\ (1.9 - .9J/J_m)\ /n_mJ_mD$ from which the thrusts can be calculated and plotted against V/ND.

Since, however, it is necessary to know the thrust at a given speed, we must obtain either the speed or the r.p.m. at any value of V/nD ratio.

For all practical purposes it will be sufficient to use an average observed r.p.m. variation versus J/J_m. The following table is based on figure 19 of N.A.C.A. T.R. 408.

It is suggested that an average variation be used, because any set of approximate formulas, while sufficiently accurate for a practical use in the case of r.p.m., may lead to a considerable error in view of the high powers in which r.p.m. appear in propeller formulas.

For completeness, the following method of r.p.m. determination is given here (formulas are in engineering units):

Speed power coefficient $C_s = .638V/P^2n^4$ but $P = TV/375\eta$ and $V = P\eta375/T$

Substituting in C_s, we obtain $C_s = 239\eta P^{.8}/Tn^{.4}$ where, approximately, $P = P_mn/n_m$; therefore $C_s = 239\eta P^{.8}n^{.4}/Tn^{.4}$

Solving for $n^{.4}$, $n^{.4} = C_sT/239\eta\ (P_m/n_m)^3$

We can simplify this expression as follows:

$T = 33000\ P_mC_t/Dn_mC_p$ and $C_t/C_p = TnD/33000P$

But $\eta = TV/375P$, therefore dividing the two last expressions, we obtain $(C_t/C_p)/\eta = nD/88V$, from which $\eta = 88VC_t/nDC_p$. Substituting the expressions for T and η in the expression, giving $n^{.4}$, we have, finally, $n^{.4} = 138C_s(P_m/n_m)^2/DJ$.

As mentioned before, when not using a standard propeller it is necessary to have the propeller characteristics curves preferably in the form of thrust and

(*Continued on following page*)

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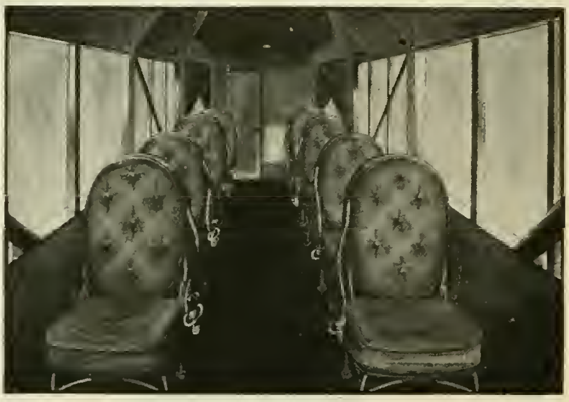

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(*Continued from preceding page*)

power coefficients.

The following procedure may be followed, then, to determine the thrusts, r.p.m. and speed of advance, V. Plot on the b.h.p. versus r.p.m. curve a curve of bhp/pn^3D^5. Since this is the expression of C_p from the curve of the power coefficient, one may find the corresponding magnitudes of J. Having thus obtained r.p.m. and J, it is easy to determine thrusts and corresponding speeds.

Conclusions

The method of take-off analysis presented in this article, while elementary in its nature, is believed to have the advantage of simplicity and clearness. The semi-graphical nature of procedure, although somewhat laborious, will enable the keeping of a clear picture of the effect of individuals' variables, their behavior and also the distinguishing of the essential from the unessential. The take-off analysis may be further extended and refined by taking into account ground and tail load effects, as well as the effect of the inclination of the propeller axis. In view, however, of the numerous uncertainties entering into the problem, it is believed that extra work involved would not be justified and that the results of a simplified study would be amply sufficient for all practical purposes.

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HIRAM BINGHAM'S N. A. A.

(*Continued from page* 19)

any vicious misuse of control and the imposition of unreasonably severe penalties upon pilots cannot be tolerated in American aviation. Not discussing at this time, therefore, control of pilots (with which I am in accord within reasonable and decent limits), I merely wish to point out that Hitler in one of his most vindictively feminine moods could not have devised a ruling more intolerable than this latest one by Dictator Bingham. While N. A. A. governors and members slumbered calmly, the virtual dictator of that somnolent body handed down his ukase, or semi-episcopal bull, warning all pilots holding N. A. A. sporting licenses that if they do not bow down to his rulings they will be banished forthwith from N. A. A. sanctioned competitions, and for not less than three long and weary years be denied absolution, and a return to the practically holy sanctification of his beneficence.

Common decency and justice demand that this three-year penalty be rescinded at once. Three years is at least half of the active competing life of a racing pilot, for few continue to race after six years. Thus Bingham arbitrarily deprives racing pilots who will not bow down and worship him of the right to make a living at their chosen profession. No man, and no association, should be or can be permitted to exercise such powers of starvation over our American racing pilots; all of us in aviation must fight not only such vicious and noxious policies, but also the creatures who can promulgate and enforce them. I call upon the decent members of the Contest Committee to force the repeal of this preposterous ruling, or else to resign from a group in which membership casts aspersions upon their honor, integrity and sense of common decency.

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Occupation ....

However, this vile ruling is only one of many reasons why Hiram Bingham no longer should be permitted to retard the progress of the N. A. A. and to harm aviation and pilots by his deplorable policies. That he has hung on for so long, a very barnacle for tenacity, is to the discredit of every member of the N. A. A., every governor, and every member of the Contest Committee. It is to their discredit for the plain reason that if they cannot change Bingham, they at least can resign and leave him to his own sorry devices, unbuttressed by the support of their good names.

During Hiram Bingham's regrettable control, the N. A. A. not only has failed to progress; it has gone backward and has lost membership and standing. It has followed the unethical course of transforming itself from a useful legislative and guiding body into a political and social publicity bureau run for the personal benefit and personal glorification of a few men.

I consider it high time that the N. A. A. purge itself of these undesirable elements, or else turn over its F. A. I. charter to a worthy body. Either course would be satisfactory to American aviation. The N. A. A. should rid itself of Hiram Bingham, Dr. George W. Lewis, John F. Victory, Godfrey Cabot and Porter Adams. To some of these I have no objection other than that they are members of the old gang. And we need a New Deal. With other members I have no complaint except for the fact that they have tolerated Bingham's policies. Secretary William R. Enyart, for example, is an honorable and efficient man, and seems to have remained uncontaminated. His services should be retained. Clifford W. Henderson, while he accepted an appointment on the Contest Committee quite innocently and has conducted himself with rectitude in all matters, nevertheless should not be a member, solely for the reason that he promotes air races, and therefore should not be placed in the untenable position of either passing judgment upon his own and others' race promotions, or else stepping out while such matters are discussed. No race promoter should be a member of a committee governing races, any more than litigants in a civil action should join the judge on the bench and pass judgment on their own cases. In fairness to Henderson, it should be added that while sponsorship of this year's races was being discussed he withdrew from the deliberations of the committee.

The N. A. A. should clean house and prove that it is worthy of the trust that we must place in the F. A. I.'s American representative. I have no quarrel with the N. A. A. if it will confine itself to its proper functions, and act with reason and decency. The members should remove Bingham and banish his policies.

JUNE, 1933

For the first time in our history, the sales of Aeronca planes have exceeded production. As production has been continuous since early 1930, it is obvious that an ever-increasing demand has caused this unusual condition.

It must also be obvious . . . to the thinking airplane prospect or operator . . . that no plane, no matter how sensationally bally-hooed, would continue to grow in public favor after four years of production, unless it was the absolute leader in its class.

To gain and hold four years of leadership, the Aeronca had to be built stronger, fly better and last longer than any other light plane in the country. This we had accomplished . . . as is proven by the fact that Aeronca owners refuse to sell their ships at less than a $1000.00 . . . even after they have flown them two years or more.

To increase this leadership, the new 1933 Aeronca had to surpass—not its imitators—but the previous Aeroncas! This we have also accomplished. Our new planes are not only sturdier, better performing, and more reliable than other light planes . . . they are also far more attractive, more finished and more comfortable than any job we've ever produced. The seat is deeper, softer and longer; the rubberized motor mounts make it vibrationless; the automatic spark-control, the full-width crash-pad, the stainless steel-edged propeller, the detachable rudder pedals, the improved tail skid, the Zerk-fitted air wheels, etc . . . all add considerably to the unquestioned superiority of our product.

This superiority can be proven—not with easily-written phrases—but with the indisputable fact that the Aeronca is outselling all others in its class; the fact that careful buyers have been forced to the conclusion that no other plane costs so little per mile; the fact that the demand has forced the factory to double its production schedule.

I can't, of course, begin to outline the advantages of this ship for private flying, for business transportation, for club flying or why it's been the biggest moneymaker in the industry as a trainer . . . but if you'll write today for our new booklet, "The Aeronca," and let us know what particular kind of flying you want to do, you'll get the whole story.

A. Eichhammer
Sales Manager

AERONAUTICAL CORPORATION OF AMERICA
LUNKEN AIRPORT CINCINNATI, OHIO

FOREIGN NEWS IN BRIEF

Canada

According to revised figures for 1932, recently released by the Canadian Government, with all operators sending in complete returns, 545,557 miles were flown on air mail routes during the year, 413,687 pounds of mail were carried, and air mail operated at 91.7 per cent efficiency.

AIR MAIL is paying in Canada, now that inter-city routes are no longer operated. It now costs the government about one cent a letter to deliver mail into remote parts of the country, whereas formerly by dog team, canoe or river steamer, the cost was far higher, and the public did not receive as frequent a service.

THERE has been a big increase in the amount of freight carried during the past year, largely due to the heavy loads of mining machinery going into the North. A total of 3,129,974 pounds of freight was carried, the largest amount since 1929. Four and a half million miles were flown during the year by all operators during 56,170 hours. Passenger traffic totaled 52,000 paying passengers and 24,800 non-paying passengers.

THERE are now sixteen routes in operation in Canada, eight of which are all-year routes, two are summer routes, and the other six operate only in winter. Two all-year routes are operated by General Airways Ltd. in Quebec; one is operated by Canadian Colonial Airways, Ltd., between Montreal and Albany, N. Y.; Brooks Airways Ltd. has one in northern Saskatchewan, and Canadian Airways Ltd. operates the other year-'round routes. Six of the seasonal routes are controlled by Canadian Airways, Ltd., which has lines throughout the Dominion. The Royal Canadian Air Force has one summer route between Montreal and Rimouski with trans-Atlantic mail to incoming and outgoing steamers, and National Air Transport, Ltd., has a short winter route over Lake Erie.

AT THE end of March, 1933, 349 private pilots, 394 commercial pilots and 354 air engineers were licensed. Aircraft totalled 353, of which 299 were commercial ships, while licensed airports had increased to 96.

CANADIAN AIRWAYS, LTD., the largest operator in the Dominion, now has a staff of eight radio operators with Harry M. McLaughlin as manager. Two Junkers planes belonging to the company are radio-equipped. Stations are located in the North, far from telegraph or other communication systems, at Fort Rae on Great Slave Lake, Cameron Bay on Great Bear Lake, Norway House at Lake Winnipeg, at McMurray at the end of the railway on the Athabasca River, and at Middlechurch near Winnipeg.

Acme Photo

De la Cierva autogiro, without fixed wings, ailerons or rudder, demonstrating parcel delivery at low speed

Germany

Production has increased from about fifteen to forty planes monthly at the Klemm light airplane factory in Wurtemberg during the last two years.

THE *Westfalen,* the steamship which is to serve as a floating airport for transoceanic air service, left Kiel last month for its station in the South Atlantic. The ship is equipped with a launching catapult and a drag sail to aid landing of airplanes in rough seas.

AIR DEFENSE MANEUVERS were reported to be carried out last month on a large scale for the first time since the World War by German forces on the coasts of the Baltic and North seas. Naval and civil organizations cooperated in conducting the maneuvers.

Great Britain

The fourteenth Royal Air Force Display will take place this year at Hendon Airdrome on June 24. Two days later the Society of British Aircraft Constructors plans to repeat the "trade display" inaugurated last year, when nearly a thousand invited guests from abroad witnessed the demonstration in flight of thirty-five different types of military and civilian flying machines.

AN AUTOGIRO that will change its direction by the tilting of the rotor shaft, dispensing with ailerons, elevators and rudder, was demonstrated recently at Hanworth by its inventor, Juan de la Cierva. A two-seater cockpit machine with dual controls, the autogiro has a maximum speed of approximately 100 miles per hour and may also be operated at a very low speed, being easily outrun by a man on the ground.

THE FIRST International Air Races for airplanes in England will be held August 4, 5 and 7 at the Portsmouth and Southsea Airport, Portsmouth, Hampshire. Guaranteed minimum prize awards of £5000, the races are to be held under the auspices of the British and International Air Races Ltd., 24 Throgmorton Street, London, E. C. 2, and will have the support of the Royal Aero Club of the United Kingdom. It is hoped that the races will become an annual event in England, replacing the Schneider Trophy Race.

Three class races with no handicapping except engine capacity will be held for aircraft with unlimited capacity, not exceeding 533.95 cu. in. and not exceeding 396.655 cu. in., respectively. Qualifying speeds will be 170 m.p.h., 140 m.p.h. and 130 m.p.h., respectively. Races will be flown over a ten-mile closed course, no race exceeding ten laps of the course.

Entries will be received until midnight of June 15, and late entries, with extra fee, until midnight of July 30.

THE GREAT WESTERN Railway air service between Cardiff, Wales, and Teignmouth, Torquay and Plymouth, which was formally opened April 12, is now in operation with two plane services daily in each direction. Flying equipment is a six-seater Westland Wessex monoplane, supplied by Imperial Airways, which also provides the pilot and ground staff.

THE NEWEST of the De Havilland airplanes, the "Leopard Moth" cabin monoplane, was expected to be test flown last month. Like the Puss Moth, the Leopard Moth is a high-wing monoplane, with the wings located about the level of the top of the fuselage. It will carry a pilot and two passengers, with baggage in a separate compartment, powered by a single 130-horsepower air-cooled Gipsy Major engine, at a speed which is expected to be higher than that of the Puss Moth. The new plane will accommodate passengers side-by-side on a wide seat behind the pilot.

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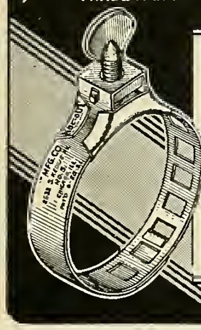

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(Continued from preceding page)

Wooden wings and a three-ply fuselage are features of the structure, which is protected from the weather by a system evolved by the De Havilland concern. Visibility from the pilot's seat is expected to be better than in the Puss Moth. Wheel brakes and powerful air brakes are expected to make the plane easy to land in, and take off from, small areas. In addition, the designers have paid particular attention to quick take-off and rate of climb.

AIR CHIEF MARSHAL Sir Edward Ellington was chosen last month to succeed, as chief of the Air Staff, the late Sir Geoffrey Salmond, who died of an illness believed to have been contracted in the East.

THE AIR JOURNEY between London and Cape Town, South Africa, now takes ten days on the Imperial Airways, compared with the eleven days of the former schedule for the 8,000-mile distance. Later in the year the time in each direction may be further reduced to nine days.

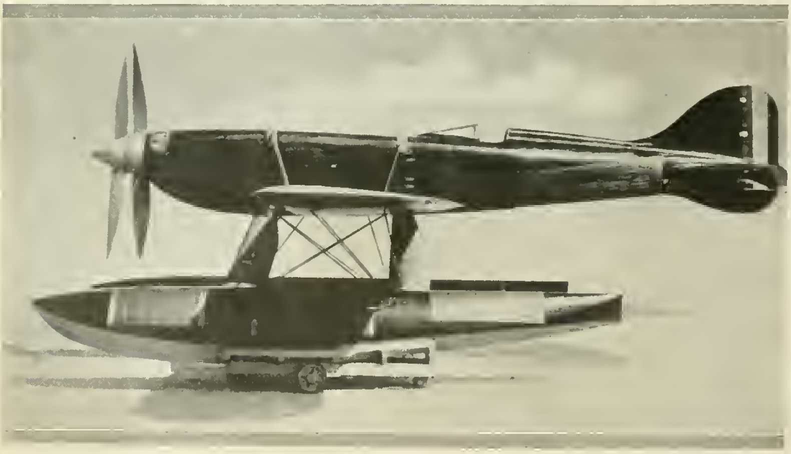
Acceleration of the time schedule is effected by cutting out the night halts at Wadi Halfa, an airdrome between Khartoum and Cairo, and at Athens. In future the southbound airplanes will fly from Cairo to Khartoum, a distance of 1,181 miles, in one day. On the northward trip the night halt after Khartoum will be made at Assuan. On the following day northbound passengers and mails will be carried to Alexandria, instead of to Cairo as hitherto, a change made possible by transshipment at Cairo from landplane to flying boat. The crossing of the Mediterranean is accelerated by making the trip of 960 miles between Brindisi and Alexandria in one day.

Imperial Airways are also planning expansion of their European services. Beginning June 1, it will be possible to leave London in the morning, spend three hours in Switzerland, and return to Londo the same night. The outgoing airplane will leave the London air station at 8:15 a.m., and Basle will be reached at 1:45 p.m. The returning plane will leave Basle at 4:45 p.m., arriving at Croydon at 10:15 p.m.

PLANS for extension of the England-India air service to Australia in three main stages are set out in an official paper tabled last month by the Secretary of State for Air, and amplified in an explanatory note circulated by the Air Ministry. First will come extension, probably in July, of the existing service from Karachi to Calcutta; second, extension on to Singapore by or before the beginning of 1934; third, establishment of the air link between Singapore and Australia. The complete airway, providing a weekly service in each direction between London and the chief Australian cities, should be in regular operation in about ten months.

The terms of the agreement proposed with Imperial Airways cover a period of approximately five years, beginning with the date of the opening of the Singapore-Australia section and ending on March 31, 1939, simultaneously with termination of the present agreement for operation of the England-India airway. The maximum subsidies payable will be £40,000 for the first year of the England-Australia service, £30,000 for each of the second and third years and £20,000 per annum for the remaining period of the contract, making a total contemplated maximum of £140,000.

The governments of India, the Straits Settlements and the Malay States have undertaken to bear the cost of providing and maintaining landing grounds and other ground facilities, such as radio and meteorological services.



Italian Macchi 72 seaplane, holder of the world's speed record

According to present plans the England-Calcutta service should be extended to Rangoon in October and on to Singapore not more than three months later. At the outset the air journey from London to Singapore will occupy ten days, effecting a saving of ten to fourteen days on the time taken by the regular steamship services from England. Between Karachi and Singapore a new company, called Indian Transcontinental Airways, will operate the service in conjunction with Imperial Airways. The capital of this new concern will be subscribed jointly by the Indian Government, Imperial Airways and Indian National Airways. "Feeder" and other services in Northern India will be the care of Indian National Airways; plans for operation of these internal airlines are already in course of preparation.

Imperial Airways and Indian Transcontinental Airways will each provide one-half of the fleet required for the through service. The fleets of the two companies will be homogeneous, and will carry passengers and freight as well as mails. As large a proportion as possible of the personnel employed by Indian Transcontinental Airways will be Indian. A number of Indians will shortly begin training in the commercial and engineering departments of Imperial Airways.

The section between Singapore and the terminal airdrome in Australia will be operated by a company promoted in Australia and subsidized by the Commonwealth Government. This company is to obtain the necessary flying equipment and set up, in conjunction with the Australian Government, the ground organization extending as far as Singapore.

Italy

The start of the Italian formation flight from Italy to Chicago is now planned for early this month. About twenty twin-engined Savoia Marchetti S-55's of the Royal Italian Air Force will take part in the flight under the command of General Italo Balbo, Minister of Aeronautics. The route is from Orbetello, Italy, via Germany, Amsterdam, Holland; Scotland, Belfast, Ireland; Reykjavik, Iceland; Cartwright, Labrador; Shediac, New Brunswick, and Montreal, Quebec. After visiting Chicago, the planes are expected to make a flight to New York.

Mexico

A total of 212 airports and landing fields were in service on May 1, of which 114 were owned by municipal governments, 42 by private interests, 24 by the military authorities, and the rest by the Federal Government, according to the aviation department of the Ministry of Communications and Public Works.

ADVERTISERS' LITERATURE

● *This service is for the convenience of those who are in the market for any of the products or facilities advertised in this issue. Read carefully the advertising of the items listed below in which you are interested, to determine whether the information offered is what you need. When filling out the coupon be sure to mention the company with which you are associated, and your position.*

1. A booklet for aircraft dealers and distributors tells the profit-making possibilities of the Pitcairn Autogiro. (*Page* 31)

2. P & W engines, standard on numerous American and foreign airlines, are discussed in that company's newest booklet. (*2nd Cover*)

3. Technical aviation books, for sale on a five days' approval plan, with deferred payments, is the subject of Ronald Press Co.'s literature. (*Page* 72)

4. Information on the new Stearman 80 is available to business executives and similar potential aircraft owners. (*Page* 3)

5. Stanavo's literature tells of the distribution of their aviation gasoline, engine oil and rocker arm grease. (*Page* 54)

6. Stinson's "Plane Talk" contains a full description of the new "Reliant" cabin (*Page* 57)

7. The Spartan School makes three Free offers to students enrolling before July 15th. (*Page* 33)

8. Full details of Texaco's rocker arm lubrication are available to pilots and aircraft operators. (*Page* 12)

9. The Vought "Corsair," effective fighting plane, makes an excellent sport plane for those interested in higher-priced equipment. (*Page* 47)

10. Rust - proof hose clamps "with the thumb screw" are described in Wittek's folder. (*Page* 63)

11. Waco explains the vital facts of quality aircraft construction and offers territorial franchises to reliable dealers. (*Page* 1)

12. Aircraft operators and manufacturers are urged to write for Wright's booklet on "Cyclone", "Whirlwind" and water-cooled engines. (*3rd Cover*)

13. O. J. Whitney, Inc., have a folder telling of their school and other flight activities in the New York area. (*Page* 58)

14. A booklet, "The Aeronca", describes that famous light plane from the angle of the private and business flier, the flying club and school. (*Page* 61)

15. B. G. plugs on American Airways' coast-to-coast and Canada-to-Mexico runs is the B. G. Corporation's newest story. (*Page* 10)

16. Boeing School's 1933 Bulletin describes enrollment requirements, courses, costs, living conditions, etc., for Flying and Mechanics courses. (*Page* 59)

17. Berry Bros. exhibit at The Century of Progress will interest everyone concerned with aircraft finishes. (*Page* 63)

18. Pilots and other visitors are invited to write for further details of the American Air Races, Chicago, July 1-2-3-4. (*Page* 59)

19. Airlines, private fliers and commercial operators will be interested in Douglas' literature describing their fast amphibion. (*Page* 4)

20. The new Boeing 247 is equipped with Eclipse starters. A booklet describes the different starters and generators. (*Back Cover*)

21. Goodyear offers complete details of their new brakes and Airwheel tires as used by T W A. (*Page* 23)

22. Aircraft engineers, manufacturers and operators are invited to write for the complete story of Hamilton Standard controllable-pitch propellers. (*Page* 29)

23. The Lincoln School, Lincoln, Nebraska, invites prospective students to write for full details of Lincoln training. (*Page* 41)

24. Ten cents in stamps will bring you Karl Ort's latest catalog of aircraft supply bargains. (*Page* 63)

25. Kellett offers full information on the new K-4; also data for commercial pilots on Giro Sky Ads. (*Page* 53)

26. Kendall tells pilots and aircraft operators where "the 30-hour oil" in cans may be obtained. (*Page* 8)

27. Aircraft manufacturers, dealers, operators and pilots are invited to write for details of the new Pioneer Electric Tachometer, Type 639. (*Page* 37)

28. Engineers, manufacturers, dealers, operators, pilots, will be interested in the details of General's new streamlined airplane tire. (*Page* 2)

29. The Ryan School announces a reduction in tuition rates and the addition of new equipment and facilities. (*Page* 9)

30. Airline officials are invited to secure complete technical and operating details of the fast Boeing 247 transport. (*Page* 27)

31. Owners and operators of cabin airplanes will be interested in the details of Switlik's new type cabin chair parachute. (*Page* 58)

32. All the details of Westport aircraft and ground radios and radio shielding are available to prospective purchasers of radio equipment. (*Page* 30)

33. Fairchild's new literature, just off the press, describes for commercial operators and private fliers, the advantages of flying a Fairchild 24. (*Page* 55)

34. Details are available on the International and Gordon Bennett Races, Chicago, September 1-2-3-4. (*Page* 7)

35. Parks Air College has a forty-page catalog entitled "Skyward Ho!" for interested prospective aviation students. (*Page* 5)

36. Contesting pilots are urged to write at once for schedule of events and entry blanks for the National Air Races, Los Angeles, July 1-2-3-4. (*Page* 6)

37. Airline and other commercial operators, and private owners are invited to write for Bellanca's story of dependable aircraft. (*Page* 25)

38. Flying schools, airports, commercial operators will find Johnson's literature on Waxing Stations profitable as well as interesting. (*Page* 53)

39. Booklet "Y" gives complete information on all flying and ground courses at Roosevelt Field. (*Page* 63)

40. Dallas School urges prospective aviation students to secure details of their courses before July 1st. (*Page* 11)

IMPORTANT

● Those desiring aircraft manufacturers' literature are requested to tell whether they are interested from the standpoint of commercial operator, business man or sportsman pilot. For school literature, please state whether you are interested in flying or ground courses. Use the margin below the coupon to supply this information.

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OXX6 TRAVEL AIR: $395. OX5 TP Swallow, $350. OX5 Robin, $575. J6-7 Waco, $2350. All ships in very good condition and licensed. Little-Greiner Flying Service, Springfield, Ohio.

WRIGHT J-5 Eaglerock, in good shape. Motor has about 250 hours; complete instruments; Bendix wheels, brakes, tail wheel, lights, steel propeller. Consider all cash offers. AERO DIGEST, Box 1542.

185 CHALLENGER ROBIN: 3-place cabin monoplane, NC licensed until next February. Just overhauled (10 hours back) and refinished. Travel Air blue fuselage, struts and wheels, with yellow wings, etc. Beautiful job and flies like new. Perfect condition and includes steel prop, lights, inertia starter with booster, brakes, compass, bank and turn. One previous owner and never cracked or otherwise hurt. Truly last word in owner's private ship. Will take $1,000 cash quick. Better wire. R. A. Rawson, Mt. Vernon Airport, Alexandria, Virginia.

CURTISS FLEDGLING trainer, with Challenger motor. Completely overhauled, licensed. Price, $750. Possibly trade for three-place air-cooled ship. Act quickly. AERO DIGEST, Box 1543.

FOR SALE: Waco F; Laird; Kinner Fleet; Ford Trimotor; 4-place Robin; Loening; KR-34; Lockheed; Stinson Jr.; Waco F-2; Lambert Monocoupe; Warner Monocoupe; Wasp C motor. Aircraft Sales Co., Hangar "D," Roosevelt Field, Mineola, New York.

FOR SALE: Aeronca, now being completely overhauled and recovered. New hardware throughout, including prop. Condition, good as new. Best offer. Will consider trade-in for Stinson Jr. N. Orlando, 58 West 45th Street, New York, N. Y.

BARGAIN: Waco cabin, 165, 80 hours. New condition, privately owned, full instrument panel, steel prop, special finish. Due to auto accident must sell. No trades. Hilo Aviation Club, R.F.D., Freeport, Illinois.

SACRIFICE CURTISS JR.: Total time 275 hours. Motor just overhauled. Hangared and licensed. The first $375 takes it. Al H. Tuerpe, 228 Furnish Avenue, San Antonio, Texas.

ONE SZEKELY 45 h.p., engine, almost new, price $250; also Szekely engine parts. Rearwin Airplanes, Inc., Kansas City, Kansas.

EAGLEROCK, Wright J6-5, completely rebuilt, four new wings, ship like new; color red and silver. $1400. J-5 Eaglerock, excellent condition, equipped for banner towing. $1500. Jamaica Sea Airport, L. I., New York.

LICENSED CHALLENGER ROBIN: Total 250 hours, 60 since overhaul, Bendix brakes, turn and bank and all instruments, $800 cash. G. D. Owsley, 946 Spanish Court, Wilmette, Illinois.

STINSON JR. S., 241 hours total, just overhauled, retractable landing lights, flares, bank and turn, rate of climb; as good as new, $2150. Great Lakes, new motor, 60 hours total, complete Pioneer instrument board with blind flight instruments, $1,000. J-5 Travel Air 4000, good, $1,200. Stinson Jr. S, 600 hours total, bank and turn, rate of climb, $2400. Waco C cabin, 75 hours total, Heywood air starter, as new, $350. Fairchild 71, in good condition, $2000. Ryan B-1 J-5, perfect, $1750. Model R. Stinson Jr., 300 hours total time, perfect condition, bank and turn, rate of climb, Elgin clock, $3500. Driggs Skylark, A-1 condition, $800. Bridges Flying Service, 5036 West 63rd Street, Chicago, Illinois.

WACO CABIN, 1932 Model, Continental 210 h.p.; excellent condition. Extras, including steel propeller, landing lights, flares, wing root fairing, pants, special blue Spanish leather upholstery and special paint job. Finished in cream trimmed in blue. Exceptional bargain. Hugh C. Robbins, Waco Distributors, Cleveland Airport, Cleveland, Ohio.

FOR SALE: S-38-B Sikorsky, latest type, 700 hours; now being completely overhauled, recovered, repainted. Purchased new and used only in the private service of one of America's largest corporations. Will be offered at a fraction of its cost and real worth. Full information and pictures to responsible people. AERO DIGEST, Box 1546.

FOR SALE: Millerized OX-5 American Eagle, late 1928, excellent condition. Licensed, always hangared, used little. Best cash offer takes it. AERO DIGEST, Box 1549.

STINSON LYCOMING JR.: 4-place, '32 series, Model S, guaranteed actual 168 total hours on ship and motor. Full set instruments, special finish, de luxe leather upholstery, best and most beautiful ship around. Original cost over $6,000; if sold quickly, $2,500. Jones Repossessed Car Sales, 121 Alexander Street, Rochester, New York.

WACO F2: Continental 165, steel propeller, pants, speed ring; just had major, rerigged for speed, extras. $3,000. Marjorie Loughlin, 2014 Ryder St., Brooklyn, New York. NAvarre 8-3266.

CURTISS JUNIOR, like new, always hangared, condition perfect. Sell at $450 or trade, flyaway this port. Johnsonville Drug Co., Johnsonville, South Carolina.

AERONCA C-3: Low time; good condition; extras. Sacrifice at $850 cash. Want heavier ship; good Lakes or Jacobs Spartan preferred. Box 1108, University, Virginia.

5-PLACE CABIN, Ryan B-1, 220 Wright with major at 300; total time 450. Never been cracked and licensed to November 1933. Trade for Fleet, Bird, Waco, Great Lakes not exceeding 110 h.p. AERO DIGEST, Box 1551.

STINSON SM8A: Lycoming 215 h.p. motor; full air wheels; tail group and tail section perfect; wings and fuselage slightly damaged. $395 complete. J. Wesiberg, 424 E. Jefferson St., Syracuse, New York.

OX-5 ROBIN: Perfect condition, all standard instruments, wings and tail surfaces newly recovered, privately owned by licensed mechanic; motor in high class condition, duals, hydraulic landing gear. Will sell for cash or trade for small ship, preferably Velie Monocoupe. Ben I. Glick, 309 West Lawrence, Blackwell, Oklahoma.

LICENSED combination wing Eaglerock, perfect condition, new fuselage cover, split landing gear. No junk. $275 or best offer. Must sell. Jack Frenzl, Appleton, Wisconsin.

CLASSIFIED ADVERTISEMENTS

Used Planes and Engines

CHALLENGER OXX-6: $600. Travel Air OX-5, just rebuilt, $595. Travel Air OX-5, dual ignition, $575. Great Lakes, $875. Curtiss Junior, $450. Hite Aircraft Co., Rising Sun Airport, Philadelphia, Pennsylvania.

AEROMARINE KLEMM: Salmson powered, air wheels, good condition, always hangared, economical to build up time. $350 cash. AERO DIGEST, Box 1552.

AMERICAN EAGLE: Short nosed, Kinner powered. Cover and paint good; Airwheels, compass, air speed. Cash or crackup accepted as part payment. Bob Curry, Seymour, Indiana.

WASP C, parts used 7-1 blower, cylinder 10 oversize; J-5 and Velie parts, used; everything in new and used Cirrus parts; Eclipse starter parts, used. Sun Battery Manufacturers, 10521 Gratiot Ave., Detroit, Michigan.

BIRD-KINNER: Perfect condition, like new, licensed to 1934, full airwheels, extra speed propeller, complete instruments, engine, cockpit cover. Fred Gassman, 43 West 12th St., Bayonne, New Jersey.

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AEROMARINE KLEMM: Salmson, 40 h.p. Two-place low wing monoplane. 232 hours. Licensed November. $550 cash. M. A. Cotts, 27 West 74th Street, New York, N. Y.

FAIRCHILD 24: 110 hours; being rebuilt at factory in Hagerstown, Md. Will be like new, including new fabric throughout. Price, $1800. S. H. Hathaway, Easton, Maryland.

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TWO OF THE BEST Buhl Bull Pups in the country. Genuine Szekely parts and Buhl Bull Pup parts. We have a big slew of these parts and they are priced to sell. Sun Battery Manufacturers, 10521 Gratiot Ave., Detroit, Michigan.

TRAVEL AIR 2000: Perfect, $600. Travel Air and Bird parts for sale. Want Bird parts or cracked ships for cash. Crane Garage, 816 Crane Lane, Toledo, Ohio.

WACO J-5: Total time, 300 hours. Engine top overhauled; licensed until May 1934. $950. Air Activities Airport, West Chicago, Illinois.

SZEKELY, 2 new, in crates; Continental A-40, new Velie, 6 hours; Velie, 50 hours; Wasp C, used; J-5, complete with Heywood starter and prop, only 80 hours from the time it was new; Cirrus Inverted, supercharger complete with steel racing prop, new. Sun Battery Manufacturers, 10521 Gratiot Ave., Detroit, Michigan.

AEROMARINE KLEMM: LeBlond 60; excellent shape, licensed to May 1934; wing tank, Airwheels, extra equipment. Price $650. Laurence Raynolds, Allenhurst, New Jersey.

STINSON R: Simplex and Monocoupe, parts of all description; new Simplex Red Arrow, less Warner motor; new Simplex Speedster, less motor. Sun Battery Manufacturers, 10521 Gratiot Avenue, Detroit, Michigan.

BRAND NEW WARNER MONOCOUPE: 24 hours total time. $2,650. R. W. Simpson, Roosevelt Field, Mineola, New York.

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CRACK UPS WANTED: Modern ships that can be rebuilt, relicensed. Complete or less motor. Any condition. Complete information first letter. R. F. Walton, New Canaan, Connecticut.

WILL TRADE Buhl Bull Pup, licensed, and Chrysler 77 roadster for licensed two-place plane. Prefer Great Lakes or Monocoupe 90 or 110. W. E. Gladson, Box 403, West Palm Beach, Florida.

EQUIPMENT WANTED: Used Cessna fuselage with landing gear, J-5 type; also Velie or Lambert motor. Carl Magnus, 1517 Tenth Avenue, Minneapolis, Minnesota.

WANTED FOR CASH: Gipsy Moth or NB-8; or light sport plane, licensed. W. B. Garrett, Thermopolis, Wyoming.

PARTS WANTED for all ships. Engines, wings, props, etc. What have you or what do you need? History, description, price first letter. R. F. Walton, New Canaan, Connecticut.

WANTED: 4 or 5 place licensed cabin job, crack-up or in need of overhauling. Will trade licensed three-place open ship or pay cash. Roosevelt Garage, Lombard, Illinois.

WANTED: Edo DeLuxe or No. 2665 floats. Also No. 4650 for Stinson Sr. Semi-air wheels, 8.50 x 10. State price and condition in first letter. Central Air Service, Battle Creek, Michigan.

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WANTED: Whirlwind straight wing Waco, Travel Air or similar job. Consider Hisso job. Have cash for bargain. J. F. Boyle, 2607 Ring Place, Cincinnati, Ohio.

TRADE: Buick eight coupe and cottage, foot of Pike's Peak, four-rooms, furnished, tax value $700, for licensed Challenger Robin. Irl Beach, Arkansas City, Kansas.

CASH FOR air-cooled Wacos, Birds, Fleets, cracked up or needing repairs. Turner Flying Service, Asheville, North Carolina.

TRADE 67-foot gasoline motor yacht, A-1 condition, 12 knots, 130 h.p., deck controls for motor; sleeps 5 and crew of 4, beautiful furniture, electric light plant, electric toilets and shower bath, hot and cold water, Protane gas stove, complete galley equipment including ice box, $21,000 spent on this boat; originally built for sea service, completely rebuilt and new motor 1929, only one season service; located at Chicago. Will trade for good 4 or 6 place cabin airplane. Write James R. Harrington, 1161 S. Wisconsin Ave., Oak Park, Illinois.

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PARACHUTES: Approved type. Seat, back, lap and chest; bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Ill. Established 1903.

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IRVIN WHITE SILK exhibition chute: 24-foot chest and 28-foot back packs, few jumps, beautiful condition, $250. F. Blazek, Hadley Airport, New Brunswick, New Jersey.

RUSSELL LOBE 26 ft. silk seat pack chute. Never jumped. Just like new. $75 or best offer. E. J. Patterson, Bath, Michigan.

Miscellaneous Products & Equipment For Sale

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MOTH FUSELAGE, upper left wing, airwheels and landing gear complete; English Gipsy motor, just overhauled. All priced low. Fonda Aviation, Inc., Westfield, New Jersey.

KINNER K-5 with front heads, fine shape, $175. New Wasp cylinder, $60. Hornet cylinder, $25. Late type Liberty, $100. Hisso, $50. Magnetos, $5. Hisso rings, 10c. Parts for OX, Hisso, J-5, cheap. Front cowling for Fleet, $10. Two completely overhauled Curtiss D-12's, $350 each. Unlicensed seaplane, J-5, $500; ready to fly. Ludington outboard racing boats, 75% off list. Frank Mills, Essington, Pennsylvania.

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STINSON PARTS for sale: Lycoming motor, complete with starter and prop.; struts, left wing and tail group. Frank Steinman, Roosevelt Field, L. I., New York.

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RYAN B-1 PARTS: Fuselage, tail group, landing gear, struts, gas tanks, etc., also Travel Air 2000 tail group, Waco 10 wings. Bargains. Gustave Imm, Fergus Falls, Minnesota.

FOR SALE: Following parts of Wright J6-9 engine: Magnetos, carburetor, Thermo Pete electric oil heater; steel prop for Cirrus 90; set Aerol struts for Monocoach. AERO DIGEST, Box 1547.

EQUIPMENT BARGAINS: Standard Steel prop, used on "B" Wasp, factory reconditioned; Paragon wood prop for Kinner K-5, good shape; 2 Irving Standard white silk 24-ft. seat pack parachutes, good condition; 4 new Wasp pistons with rings, standard size; 1 Kinner K-5 19 stud standard size cylinder with new head, in good shape; 1 V-AG9-D Scintilla 9 cylinder magneto, good shape; 1 PNS-D Scintilla 5 cylinder magneto, good shape; 1 used Type D-2 hand wobble pump; 1 International flare pistol with 2 one-minute flares; 1 used Wasp "B" cylinder, good shape. Make us an offer on any of the above material. Yellow Cab Airways, Des Moines, Iowa.

FOR SALE: Edo pontoons, suitable for J-5 Waco, J6-5 or Challenger Robin, $450 cash. Post Office Box 250, Jackson, Michigan.

FOR SALE: One brand new Gardner propeller, without spinner, for Velie M-5, perfect, only $29.50. Also have new propellers for Heath B-4 and Ford-powered engines at attractive prices. Write us on your propeller requirements. Sensenich Bros., Lititz, Pennsylvania.

WINGS, TAILS, Vee struts, axles, rudders, fuselages for Waco, Ireland, Sikorsky, Travel Air 2000, 4000, 6000 A, Command-Aire, $35 up. New Zenith carburetors, $5; Zenith altimeters, $2.75, postpaid. Edo pontoons, Moth, $250. K. W. Olson, 3504 Sixteenth Ave. South, Minneapolis, Minnesota.

J6-7 MAGNETOS, $30; exhaust valves, $10, late type-pistons, $6; 90-hour cylinders, $35; rocker arms, $2.75; and J6-9 carburetor parts. Overhauled J6-5, $450. Overhauled D. H. Gipsy engine, $155; Eclipse starters, $20. J5 magnetos, $35. J5 pistons (late), $5. AERO DIGEST, Box 1554.

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ALL FLYING WING designer and builder wishes to contact someone interested in financing two-place test plane. H. E. Burnett, Box 11, Coquille, Oregon.

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4:11 pm Ar. BUFFALO	(EST) Lv. 5:02 pm
4:23 pm Lv. BUFFALO	(EST) Ar. 4:50 pm
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